VERTEBRATE ANIMALS OF POINT LOBOS RESERVE, 1934–35

By

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and

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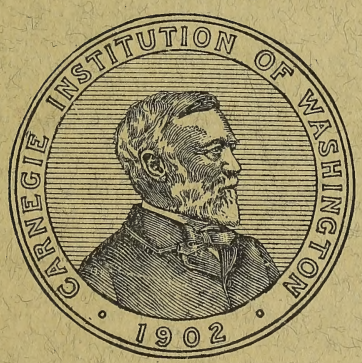

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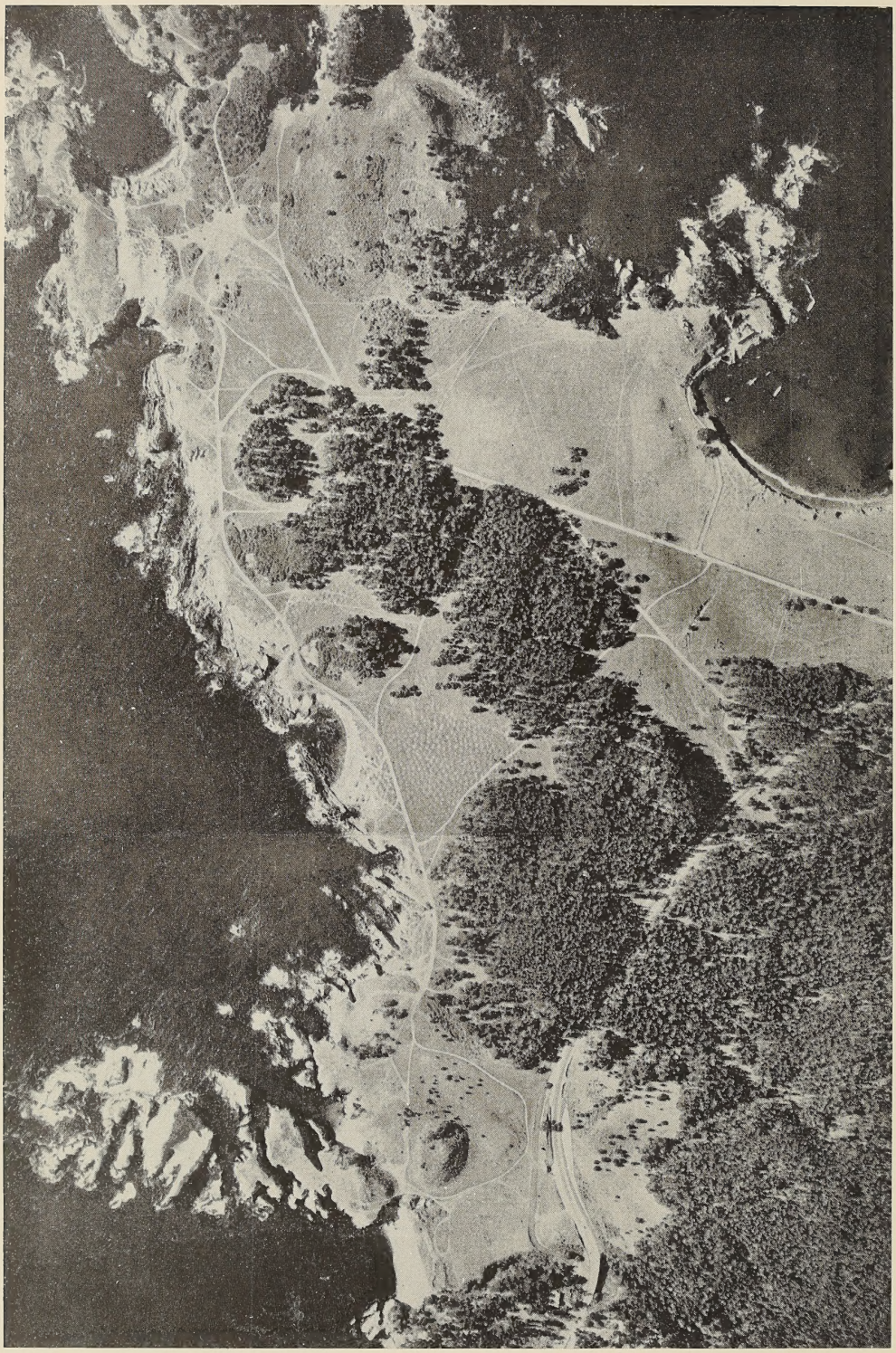

Air view of Point Lobos Reserve showing main topographic features of the area and chief types of vegetation. Roads and trails in use in 1934 show conspicuously in this photograph. Compare with text-figure 1, page 34.

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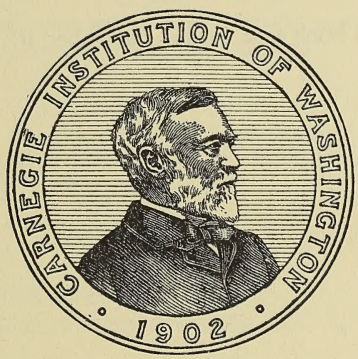

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Field work carried on, and the results published, under the auspices of the Save-the-Redwoods League and the Carnegie Institution of Washington for the California State Park Commission

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VERTEBRATE ANIMALS OF POINT LOBOS RESERVE, 1934-35

INTRODUCTION

A State park may be maintained for any one of several justifiable purposes. But the special purpose for which each park is established, and kept, should be clearly understood by all persons directly concerned and responsible for the management of that park. Areas set aside for play, for landscape viewing, or for the broader types of inspiration, may be cared for so as to obtain the greatest utilization possible; but distinction must be made as to the purpose of each particular area and care should be exercised not to confuse, or attempt unwisely to combine, many uses for one small area.

Point Lobos Reserve, it seems clear to us, justifies its purchase and permanent care preeminently as a unique example of the natural character of the narrow coastal strip of California. It is not actually a sample of any static condition on the coast; but it contains all the elements and qualities necessary to demonstrate the nature of the interaction of the natural processes which occur at one point. These processes are dynamic and they change continually, as they have always changed and as they will, if allowed, continue to change. They involve the sea, the land, the plants, the animals, and all the atmospheric and radiant forces of climate. In addition, and most important of all because of the possibility of improper interference, must be considered the influence of the presence and activities of man in this area.

To anticipate still further the results of our study in this area, we are convinced that effort should be aimed not directly to the permanent preservation of any specific objects now occurring in the park, but primarily to insuring freedom for all the natural processes which have produced those objects and which if permitted will, we believe, tend to maintain them for a long time in their most valuable form. This involves a degree of understanding and appreciation of these processes which we admit is difficult to attain and which probably is not now very wide-spread.

The opportunity to study the vertebrate animals of Point Lobos Reserve, in Monterey County, California, which came to us in the summer of 1934 was welcomed mainly for two reasons. In the first place, we believe that the part taken by the animal life in state parks and particularly in Point Lobos Reserve is important and needs definition and evaluation. That is, this phase of the resources of a park area needs more attention than it has received or is likely to receive in the establishment of such parks unless special studies are carried out and the results heeded in plans for permanent administration.

We were glad also to have a chance to make another study, even a sketchy, preliminary one, of the vertebrate animals of a defined, small bit of land. It is from the accumulated results of studies of the environmental relations of animals on many small areas in localities of differing geographic character that solutions of many most perplexing problems in natural history may eventually come. As a result of previous practise in carrying out similar surveys, and in order to make as wide use as possible of the materials we anticipated would accumulate, we selected as our immediate objectives, in making field observations: to determine, or to gather information which would show the kinds of land vertebrates present within the Reserve; and for each kind the frequency of occurrence and the relative abundance; the habitat occupied; the more appreciable relationships with the physical environment; the nature of its biotic relationships; and the annual cycle of its activity in the Reserve.

Point Lobos Reserve is almost exactly in the middle of California's coastline and it is one-third the way from the Mexican border to the Canadian border of the United States. The Reserve is less than half a mile north of 36 degrees 30 minutes north latitude, and the line of 121 degrees 55 minutes west longitude runs just to the east of it.

A more exact notion of the position of this spot may be gained by tracing the parallel on which it lies. To the eastward this line runs through Sequoia National Park and Owens Lake in California and the Grand Canyon in Arizona. It runs approximately along the northern boundary of Texas where it borders the pan-handle of Oklahoma and close to the northern borders of Arkansas, Tennessee and North Carolina. Other locations on this latitude if it is followed around the earth are the Straits of Gibraltar, the Island of Crete, the northern confines of India, and Tokio, Japan.

A line straight north from Point Lobos would pass near Seattle, Washington, and through Great Bear Lake in Northern Canada. To the south this line runs through the South Pacific Ocean about halfway between Pitcairn and Easter Islands.

ACKNOWLEDGMENTS

In our field work upon the area of the Reserve during the year we received innumerable helps from Warden Raleigh A. Wilson and his hospitable wife. Mr. Wilson possesses the naturalist's appreciation of the kind of State resource he serves in guarding, and we had the benefit in many instances of his first-hand experience with the conditions there. With Mr. Laidlaw O. Williams, the accomplished bird-watcher residing at Carmel, who visited the Reserve frequently, we had many conversations, profitable to us in helping estimate the bird population on the area. Mr. Lawrence V. Compton contributed his photographic skill on one trip, aiding us to obtain a long series of pictures of ecologic bearing, selections from which are used in our present report. Mr. George B. Vaughan supplied us with many invaluable

materials in the form of maps and other records. Mrs. Joseph Grinnell likewise helped add to our photographic records and she also cooperated on many days in taking bird censuses. As a result of the generous aid of Professor Ralph W. Chaney, University of California, and of Captain B. L. Canaga, United States Navy, the Chief of Naval Operations authorized the release for publication here of certain air photographs taken from the U. S. S. *Macon* (see plates 4 and 5).

To Doctor John C. Merriam, President of the Carnegie Institution of Washington, are we indebted for the original suggestion of the importance at this time of making a faunal survey of the Point Lobos Reserve. And his idealism combined with a certain kinetic resourcefulness has resulted in the final production of our report in published form. Mr. Newton B. Drury, Secretary of the Save-the-Redwoods League, helped us in many very practical ways, in his administrative capacity and otherwise. His influence throughout was sympathetic as well as stimulative to the carrying on of our work and the development of our ideas. Finally, to Miss Annie M. Alexander, founder and continuing benefactor of the California Museum of Vertebrate Zoology, are we lastingly grateful for the favorable opportunities and scientific resources provided within its precincts, without which we could not adequately have worked up the information gathered in the Reserve and selectively incorporated in this report.

GENERAL FEATURES OF THE AREA

(In so far as they affect vertebrate animals)

TOPOGRAPHY

Point Lobos, topographically, is varied even though it is without any extraordinary features of landscape. This circumstance results in a fairly rich fauna, considering the geographic position. Access to the land and its inhabitants for human observation is easy. Many of the factors effective in determining the various kinds of animals which occur here are modified in some way by the topographical character of the land surface; for example, a slight slope toward the morning or afternoon sun greatly increases the warmth of certain strips of land here. Added to this, the various ridges and knolls are effective in deflecting the course of the wind so as to produce many types of climate locally within this small area, of but 336 acres.

For the most part the bluffs are higher and more precipitous along the northern shore than along the southern. Back from the bluffs the land generally is rolling, with gentle slopes from near the center of the peninsula toward the ocean or it is nearly flat. The remains of terraces made at former levels of the ocean are still fairly distinct. At least three flats of this sort may be distinguished. The tops of Big Dome, Little Dome, Whalers Knoll, and Rat Hill may mark a former high ocean level for this area. At later stages in the history of this land they were probably islands.

One characteristic of the area which is important for animals is the absence of fresh water on the surface, except for the temporary pools and

runoff immediately after rains. The south boundary of the Reserve is marked by a short section of Gibson Creek which now carries water only intermittently during the winter. One or two seepy spots keep moist for a time after the rainy season. Most of the animals which live here, therefore, are those that can get their moisture from other sources than surface water. Some individuals make use of waste water from the supply piped in for human use. During our study, two hydrants out toward the Point maintained a permanent supply of water for the animals close to them.

The underlying rocks at Point Lobos affect the animal life indirectly through their influence upon the vegetation and directly in their provision of feeding grounds, resting places, and nesting sites along the shore. Another sort of influence relates to the water-holding properties of the ground surface. At many places the underlying impervious strata act to keep the soil soaked during the rainy season.

The oldest rocks on the area are exposed in the neighborhood of Vierras Knoll, on most of the main Point, and along much of the northern shore. They constitute a coarse-grained, gray, igneous rock that has been named the Santa Lucia granite. This rock is of special biotic interest because of its apparent direct relation to the distribution of the cypress trees in this vicinity. (See Lawson, 1893.)

The Carmelo formation is composed mainly of thick-bedded conglomerate sediments of dark color interbedded with sand and sandy shale. This series is a sedimentary deposit upon the worn and uneven surface of the granite. This deposit is noticeable especially along the southern shore of the Reserve and along the south side of Carmel Cove.

Above these two layers are extensive accumulations of Pleistocene terrace deposits and lesser amounts of modern alluvium and beach deposits. Fortunately the latter have been little disturbed by the recent human activities in the Reserve. This adds greatly to the prospects for a speedy renewal of a normal interaction between the biota and physical conditions in the area. (See pls. 1-4, pl. 5, fig. A, text-fig. 1, p. 34.)

RECENT HISTORY OF HUMAN USE

We have not undertaken an exhaustive study of the history of human use of the area now included in Point Lobos Reserve. In a more extended study of the animal life of the Reserve it would be necessary to trace in detail environmental changes that have resulted from the presence of man and to interpret the effects of those changes upon the animal life. However, this study is restricted to an account of only one annual cycle of change and this at a time when rapid progress was being made in recovery from certain types of human use of the land. Much of the significance of events in the past can be determined better by a longer period of study. Hence only the main types of human modification of this area will be mentioned and no attempt will be made to trace accurately their chronology.

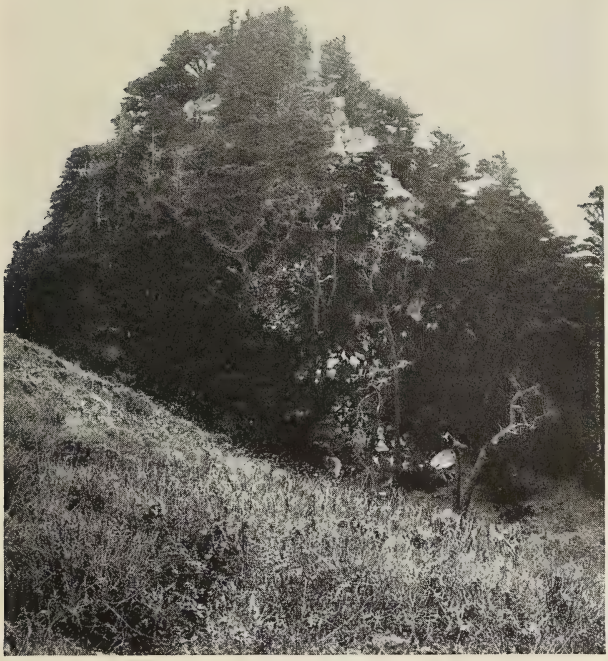

Fig. A—Big Dome from northern rim of Whalers Knoll. This tree-covered granite hill reaches more than 250 feet above sea-level and is most rugged as well as highest part of Point Lobos Reserve. The outer, sea-facing side is even more abruptly precipitous than the sides shown here. Cliffs on this dome were permanent headquarters of a pair of duck hawks. Photographed on December 12, 1934.

Fig. B—Vierras Knoll from north. Shape of this hill is almost exactly that of Whalers Knoll, but the size is much smaller. The various types of brushland plants which occur on slopes and on tops of these hills furnish living quarters for all the kinds of chaparral-inhabiting birds of the area. Conditions vary greatly from the rather moist northeast slopes to the extremely dry southwest slopes. Photographed on December 14, 1934.

Fig. A—South side of Cypress Point, from near Point Beach. The steep granite shore back of which stand the patches of cypress trees marks the seaward limit of wandering of many land birds. This illustrates relation of cypress trees to underlying rocks. Photographed on September 24, 1935.

Fig. B—Sea Lion Point from western rim of Whalers Knoll. The large amount of ground kept bare by automobiles and the conspicuous strip of sand "blow-out" are on opposite sides of an extensive area of bush lupine and associated plants. These provided homes for large numbers of sparrows, especially white-crowns. Seal Rocks show in distance. The Carmelo formation is exposed on this point. Photographed on September 25, 1935.

Fig. A—Air view of Point Lobos from a point over ocean to westward. The Santa Lucia Mountains shown in background have an influence upon the fauna of Point Lobos. Figures A and B plate 4 and A plate 5 are copies of photographs made from U. S. Navy Dirigible *Macon* in September or October 1934.

Fig. B—Air view of Point Lobos from same direction as figure A, but nearer. Contrast in ruggedness of northern shore of peninsula with lower southern shore is plainly seen. Also proportions between timbered and open land and their relations to hinterland are indicated in figures A and B plate 4 and A plate 5.

Fig. A—Air view of Point Lobos from south. This is the view presented to offshore birds flying northward along the coast, and it shows the chief elements—configuration of land and nature of its vegetational cover—which determine kind of response they make to the area.

Fig. B—Stubble after a crop of oat hay had been removed. This was the last extensive part of the area to be disturbed before it became state property. Greatest changes in ground cover and its animal inhabitants took place here during the year in which we made observations. Photographed on December 11, 1934.

For many years, even though under private ownership, the Point has been considered to be of exceptional scenic value and it has been visited by many people on sight-seeing trips. These people had rather free access to the land for walking, picnicking, fishing, and even the removal of certain types of materials. An admission charge tended to restrict the extent of these practises.

Much of the area has been pastured regularly by cattle and horses. Chopping of trees for firewood has been customary for a long period of years, and apparently most of the largest trees have been removed for this purpose. Chaparral plants were, as a rule, not directly injured.

The flat, open portions of the Reserve have been plowed at various times in recent years. The last of these portions to be put into cultivation, in the vicinity of Carmel Cove, produced one crop of oats before the land was taken over for public purposes. This disturbance of the soil upset the equilibrium of the vegetation, but it resulted in no extensive, permanent loss of soil material except in a few restricted spots.

A series of photographs assembled by Mr. George B. Vaughan shows to some extent the nature and degree of change at many spots in the Reserve. Many of these pictures were taken early in the century and others in 1934 were made at approximately the same locations. An examination on November 12, 1935, of contrasting pairs of photographs, taking into account also current conditions, resulted in the following general impressions concerning the changes demonstrated.

1. Stability of the trees, especially the cypresses, was revealed by the broken dead snags often appearing almost exactly the same in the two pictures.
2. Rapid growth of the pines showing the main tracts to be composed largely of young trees.
3. Slight extension of the area covered by pines.
4. Small amount of change (loss) in soil considering type of use in interim.
5. Seasonal effects on ground layer of plants, especially the grasses, resulted in marked differences in appearance of the area in different years.
6. Desirability of continued non-interference with natural processes, to avoid serious effects like those resulting from the flurry of the last clean-up in the woods.

PRESENT TREATMENT BY DIVISION OF PARKS

This Reserve stands as an exception among state parks, not only in California, but over the whole country, in the effort that has been made to study and interpret its qualities so as to determine its greatest significance for the State. The Division of Parks has worked with the Save-the-Redwoods League in an effort to understand the true values of this Reserve and to learn how best to make them available to the public and especially to visitors.

One of the early steps in this investigation was the preparation of a set of suggested regulations for the activities of visitors. Pending the formu-

lation of a satisfactory permanent policy of management, these were adopted by the State Park Commission and a printed copy is handed to each group of visitors to the Reserve. In general the effect of these rules (see below) has benefited the Reserve, but additional steps must be taken if the deterioration of the qualities of the land is to be prevented.

Rules for the Use and Protection of Point Lobos Reserve

With the object of keeping unspoiled for public enjoyment the beauty and interest of Point Lobos, we ask your cooperation in observing the following rules:

1. No plant or animal life of any description should be disturbed, injured or removed. This includes sea-weed, shell-fish and other marine life along the shores.

Besides its appeal to the lovers of beauty, Point Lobos has great interest as a reserve for native plant and animal life. The aim is to disturb as little as possible the normal processes of nature.

2. Fishing with hook and line from the shore is permitted, except within the Cypress Point area.
3. Soil, rocks, brush and dead wood should be left undisturbed.
4. Pedestrians should stay on trails wherever the ground is steep or loose and plants liable to be damaged.
5. Motorists should keep to the roads and parking places provided, and not drive elsewhere.
6. No fires should be built, except in established fireplaces at designated picnic areas. Firewood should not be gathered, but will be furnished by the Warden.
7. Picnic parties are permitted, except in the Cypress Point area. No camping is allowed.
8. No firearms are permitted, nor dogs allowed, in Point Lobos Reserve. Leave both with the Warden.

These rules have been adopted by the California State Park Commission for Point Lobos, and will be enforced. By law, their violation is a misdemeanor. This park belongs to the People of California. Enjoy it and help preserve it for the present and the future.

State of California, Department of Natural Resources, State Park Commission.

These rules have been enforced in recent months by the alert watchfulness of the Warden at the Reserve. A considerable amount of unnecessary wear on the land probably has been prevented by the fee of fifty cents charged for each automobile. Surprisingly few people have used the opportunity to enter the Reserve free by leaving their automobiles outside the gate and walking.

ENVIRONMENTAL RELATIONS OF THE VERTEBRATES

CLIMATIC

As at other places along the coast of central California the most noticeable climatic features at Point Lobos are the moderate temperatures, frequent fogs, and high winds. These probably have a less important influence upon the animals of the area than the peculiarities of seasonal distribution of the rainfall. The concentration of rain in the mid-winter months and its almost complete absence in summer are major factors in the composition of the fauna and in the seasonal behavior of the animals.

The winds are generally from the northwest or southwest and blow over the land from the water; sometimes in winter there are strong southeast winds. In the summer months the wind comes steadily from the west nearly every afternoon. The month of May is as a rule one of maximum air movement. As illustration the following figures show records of wind movement for May 1903, at Point Lobos, as indicated by McAdie (1914, p. 144): Total for month, 15,431 miles; average daily, 498 miles; greatest in 24 hours, 929 miles; greatest hourly, 60 miles.

Records of precipitation kept at Point Lobos, beginning in January 1893, were summarized by McAdie (1914, p. 222). According to these records the greatest seasonal rainfall for this period was 25.57 inches; the least seasonal rainfall, 11.41 inches; the greatest monthly rainfall, 13.06 inches.

Rainfall at Monterey, eight miles to the north of Point Lobos and on the opposite side of Monterey Peninsula, has been recorded for a long period of years. The record from 1847 to 1910 is summarized in Bulletin W of the Weather Bureau, United States Department of Agriculture, summary of the climatological data for the United States, by sections, section 14, page 10. Means shown for each month are as follows, in inches:

July	0	February	2.74
August	0.02	March	3.21
September	0.27	April	1.38
October	0.85	May	0.50
November	1.55	June	0.10
December	2.79	Mean annual	17.58
January	3.29		

For the period 1879 to 1909, the season of least rainfall was 1898 with 6.95 inches; of greatest rainfall, 1907, with 29.80 inches. The average seasonal rainfall for this period was 16.13 inches.

Normal temperatures reported for Monterey on page 16 of the same bulletin are as follows:

	F°		F°
January	50.2	August	61.9
February	51.2	September	61.5
March	53.9	October	58.2
April	55.8	November	54.3
May	58.3	December	51.7
June	60.8	Annual	56.6
July	61.0	San Francisco	54.9

WEATHER

For the present discussion we have used a dictionary definition of weather, as the state of the air or atmosphere with respect to heat or cold, wetness or dryness, calm or storm, clearness or cloudiness, or any other meteorological phenomenon. At Point Lobos the ordinary daily changes in weather are likely to be almost as great as the whole range of climatic change in a year. In the same way, modifications resulting from physiographic features of the area often were larger than the annual range in a spot of average exposure.

Point Lobos is affected by the ocean even more than other localities along the coast. By projecting into the water, it is nearly independent of the influence of the mainland as far as weather is concerned; however, the point on the north side of Carmel Bay projects even farther into the ocean and thus offers some protection from the north. Nearly always the wind blows across the land from the water and thus assures less extreme temperatures than even the adjacent stretches of coast. There are few days, even when the sun shines, but when a person requires a coat for comfort, and in the shade it is usually distinctly cool.

Here the fogs are probably the most distinctive feature of the weather from the point of view of vertebrates. Fogs blanket the point more completely and more often than even the immediately adjacent mainland. Byers (1930) has written an extensive account of the fogs which occur almost daily through the summer along the coast of California and Lower California. He accepts the common assumption that the fog is formed over the ocean by a condensation of water vapor in saturated air passing over a cold-water surface of the ocean. When the fog moves over the land it usually is lifted above the ground so that summer fogs at sea-level over the land are observed only at times of very slight air movement. At Point Lobos, though, the fog often pours directly over the land. Apparently each particle of fog condenses around a salt nucleus. At inland localities it contains so little moisture that objects moving through it often remain dry, but at Point Lobos even stationary objects, the trees, bushes, grass and even the ground, are often dripping wet.

The fogs affect animals in several ways. First, they obstruct vision and so hinder the long-range use of this land as a guide in flight and impede the activities of predators. The most important effect, however, is in the cooling of the air by cutting off the sunshine. Not only did the vertebrates appear to us to respond to this directly in some of their activities, but there was an obvious response by the insects on which some of them fed. In the sunshine the insects would be so freely active that often many birds could be seen pursuing them in the air. With the coming of the fog and the cooling of the air these insects sought warmer localities or, possibly, withdrew completely from accessible situations, and foraging birds proceeded to hunt in an entirely different manner on these occasions. However, it was not learned whether this actually brought a change in numbers of

vertebrates on the area. It does seem that in seasons of less abundant food supply than the past one, this factor might easily cause a reduction in the bird numbers on the area.

Another expression of the weather properly to be considered here has to do with the amount of reflected light in this area and the variations in it resulting from different habitat conditions. Our observations suggest that intensity of reflected light is one of the factors involved in the habitat selection by vertebrates. An idea of the variations in this factor may be gained by examining a series of readings made by use of a Weston exposure meter, model 650. The tabulation given below shows readings at fifteen places on the area at 11 a. m. on two days: October 8, a cloudy one, and October 9, a nearly clear one.

LIGHT REFLECTED FROM GROUND, IN FOOT CANDLES PER SQUARE FOOT

Kind of situation	Oct. 8 (cloudy)	Oct. 9 (clear)
Under cypress, no low vegetation	1.3	1
Thicket of young pines east of Mound Meadow	3.2	2
Under close-growing young pines heavily festooned with lichens	8	3.2
Under large pines on open floor	20	6.5
On grass-covered floor of pine woods	32	20
Among sage bushes at southwest base Whalers Knoll	40	130
In middle of newly burned grassland	50	80
In dead and dried grass east of entrance to Point	65	160
In bare fire trail at south base Whalers Knoll	80	200
In path through ceanothus at base of Point	100	320
In grass near burned area	130	200
In open path at entrance to main point	160	400
In gravel roadway west of Mound Meadow	200	320
In road 100 yards west of Warden's House	250	500
On rocks at west side of Warden's House	400	800

As an example of the intimate connection between the activities of animals (birds) and changes in the weather, observations made on March 22 may be cited. The morning was warm and clear with little wind and there was great activity among birds. At noon the sky became completely overcast, the wind rose and the air became colder. During most of the afternoon a mist was falling, but there was no actual rain. With this change every sign of nesting activity stopped. Most of the birds became almost completely quiet. After three or four hours they began to forage, but most species were then in flocks. Their behavior was almost completely that of winter—and of the colder days of that season.

At 3 p. m. on November 30, there was absolutely no wind—the air becoming warmer and sultry—the sky was slightly overcast and the sea smooth with very weak surf and little ground-swell. The scarcity of water birds to be seen in any direction under these conditions was striking.

On December 1, in the afternoon, a north wind was blowing and the small birds were lying low in the brush. December 24 was clear, with cold north or northeast wind. In sheltered places it was warm. However, an observer got no impression that small birds were congregated where sheltered from

the wind, though they were seen in late afternoon mostly on the sunny sides of trees and of forest tracts.

A south or southeast gale with intermittent rain came on the night of January 3, continuing, but less intense, the next forenoon. During the morning there was a driving mist, but with frequent bursts of sunshine. A heavy surf was running in from the south-southwest. Opposite Mound Meadow extra high combers reached all the way to the dark soil of the meadowland, showing in actual process cutting-back by the sea. On Gibson Beach the surf reached to the foot of the bluff. All along the southwest-facing shoreline huge waves were carried against the bluff and in places up over its rim, adding to the run-off from the rain to erode the terrain and wash it into the sea.

The gale was heaviest just after midnight, when two tall pines close to the Warden's House were blown down, not broken-off, but up-rooted. Possibly the normal root anchorage of these trees had been impaired in some way through the human activities around them. They were the only live trees noted that had blown down, though at least seven dead ones newly down, mostly broken off near their bases, were seen. There were also numberless branches, up to considerable-sized ones, live as well as dead, broken off and strewing the forest floor. Innumerable skeins of lichens had been torn off the trees. This new litter was most conspicuous where the forest floor had recently been cleaned up. The new installment of natural litter combined with the material already on the ground was looked upon by us as insuring adequate living quarters for increased numbers of small vertebrate animals.

Birds which normally foraged on open ground, that day wind-swept, had forsaken their usual areas and had resorted to other places which provided at least partial shelter from the wind. The brown pelicans on Bird Island were huddled together on the protected, landward side of the island. On Seal Rocks not a single sea-lion was in sight on the islands, but twenty or more were swimming in the water in Point Cove.

The true significance of many of the items included in our accounts of species may be connected with the nature of the weather at the time of, or previous to, their occurrence. For its possible usefulness in this connection the following tabulation of weather conditions during the first six months of 1935 at Point Lobos is included as supplied to us by Mr. Raleigh A. Wilson, Warden at the Reserve.

	Jan.	Feb.	Mar.	Apr.	May	June
1	Clear	Clear: warm	Rain	Fair	Fair	Clear
2	Clear	Clear: warm	Cloudy	Cloudy	Clear: warm	Clear: warm
3	Fair	Rain	Cloudy	Rain a.m.	Clear: warm	Fog
4	Rain: gale	Cloudy	Rain	Cloudy	Clear: warm	High fog
5	Cloudy	Fair	Cloudy	Clear: warm	Clear: warm	Fog
6	Fair	Fair	Rain	Rain	Overcast: high fog	Fog
7	Cloudy	Cloudy: rain	Rain	Rain	Overcast: high fog	Clear

	Jan.	Feb.	Mar.	Apr.	May	June
8	Rain	Fair	Fair	Showers	High fog	High fog
9	Rain: wind	Fair	Clear	Rain	High fog	High fog
10	Rain	Fair	Clear	Fair	High fog	Fog
11	Fair: clouds	Showers: overcast	Clear	Fair	High fog	Clear: warm
12	Clear	Overcast: high fog	Clear	Clear	High fog	Fair
13	Cloudy	Overcast	Clear	Fair	High fog	High fog
14	Rain	Fair	Misty	Rain	High fog	Fog
15	Rain	Fair	Clear	Rain	Fair	Fair
16	Rain	Clear	Clear	Cloudy	Fair	Fair
17	Rain	Clear	Clear	Clear: warm	Clear	Clear
18	Rain	Clear: warm	Fair	Clear: warm	Clear	Fair
19	Fair	Fair	Clear	Clear	Clear	Fair
20	Clear: north wind	Fair	Clear	Clear	Clear: warm	Fair
21	Clear: ocean calm	Fair	Cloudy: showers	Clear: north wind	Clear a.m.: fog p.m.	Fog a.m.: fair p.m.
22	Overcast	Clear	Showers	Fair	Fair	High fog
23	Clear: warm	Clear: north wind	Rain	Clear	High fog	Clear
24	Clear: warm	Clear: north wind	Fair	Clear: warm	Fair	Fog
25	Clear: warm	Clear: cold, north wind	Cloudy	Clear: warm	Fair	Fair
26	Clear: warm	Clear: cold, north wind	Fair	Clear: warm	Clear	High fog
27	Clear a.m.; overcast p.m.	Clear	Clear	Clear: warm	Fair	Fair
28	Clear: slightly overcast	Clear	Fair	Fair	High fog	Fair
29	Overcast		Fog	Rain	High fog: rain	Fair
30	Fair: warm		Fair	Rain a.m.; fair p.m.	Fair	Fair
31	Clear: warm		Clear		Fair	

HABITAT DIVISIONS

The vertebrates which live at Point Lobos come to be there by several ways. Some are born and reared on the area; certain kinds may occupy it for many successive generations without moving outside the Reserve boundaries. Of the terrestrial vertebrates this applies especially to the amphibians, reptiles, and some of the mammals—those animals whose food habits and restricted locomotion tend to keep them at a fixed location. Another assemblage of animals includes species and individuals which live in the general region of the Point and which come there for long or short periods, but which occupy this ground for only a part of their activities. Another, and a large, share of the animal population here belongs to the place only in migratory status. These migrants, mostly birds, may live on the Point only during the breeding season, they may come for the winter, or they may be only transients that are present for a few minutes or for many weeks in spring or autumn.

The geographic location of the area mainly determines what animals come to it, but whether or not each individual stays after it has arrived is largely dependent upon the nature of the surroundings at the time of its arrival. The general circumstances which determine residence or persistence of the animal after it has arrived involve internal factors (not here analyzed, but recognized) and external factors (those of the whole region, and those of the Reserve itself). The present discussion, then, is concerned with those qualities of Point Lobos which make it habitable by terrestrial vertebrates.

In many ways this area may be considered as a single environmental unit within which each animal selects, or is restricted to, those conditions most suited to it or the ones which it can tolerate. However, as a means of simplifying our discussion of this problem and of clarifying the relationships to be analyzed we have adopted and followed a classification of the major habitat divisions which may be easily recognized by gross features of topography and vegetation and which are sufficiently well represented here to exert conspicuous influence upon certain of the vertebrates. A more detailed study would justify, possibly, a finer division. The four main divisions here recognized with brief mention of their outstanding characters are as follows:

Grassland—including ground recently cultivated and now covered mainly with non-native plants as well as that on which native grasses grow.

Brushland—especially where lupine, poison oak, and ceanothus predominate.

Forest—as constituted by live oak, pine, and cypress.

Ocean shore—represented, in extremes, by rocky bluff, sandy beach, and island.

Grassland

Grassland makes up a larger portion of Point Lobos than any of the other kinds of habitat. Nearly half the ground surface is now covered by some type of low-growth vegetation, and all of this is here considered grassland. Although this may have been the first type of plant cover to become established on the area, it is now the least stable and is present in greatest variety of form. Here belong practically all the non-native plants. Changes take place here most rapidly and the effects of those changes are quickly discernible in the responses of the vertebrate animals.

From the standpoint of needs of the animals, the grassland exhibits several features which contrast markedly with other habitat divisions. Subsistence must be sought here usually in a much thinner, shallower stratum than elsewhere. Some animals get all their food directly on the ground surface or within reach as they stand on the surface. Others cling to the stems of the low plants while they eat the leaves, or the seeds, or the other animals which they find there. A great many find it profitable to burrow or scratch beneath the surface to reach roots or soil-inhabiting small animals.

Several predatory species normally range over the grassland where the

Fig. A—Oat patch in most luxuriant stand, near Carmel Cove. Within this mass of plants a colony of red-winged blackbirds nested. This is same ground shown in figure B, plate 5, but from a slightly different angle. Photographed on July 1, 1935.

Fig. B—Two types of grassland on Point Lobos. The middle ground had been undisturbed by cultivation long enough to have a fairly stable plant cover including many kinds of perennial grasses. The foreground was nearly bare, after a single year of cultivation. Soon after this picture was taken it was covered with a dense growth of high plants, mostly annuals (see figure A). Photographed on December 11, 1934.

Fig. A—Mound Meadow, looking toward north from southern border. The dense cover of grasses and low plants was luxuriant between mounds as well as on their tops. Absence of thickets or groups of taller plants restricted the number and variety of vertebrate animals here. Photographed on July 1, 1935.

Fig. B—Bush lupine on sandy ground at base of Sea Lion Point. White-crowned sparrows built nests in this type of bush and spent much time in and near it the year round. Photographed on December 14, 1934.

freedom from obstructing vegetation contributes to their prospects of finding suitable prey. This in turn requires that animals which live in this low vegetation be so colored as to escape easy detection or that they have access to burrows into which they may escape from view. Such a habitat encourages the exercise of acuteness in the senses of sight and hearing and of alertness in starting to escape when danger threatens. There seems to be considerable instability in the amounts of certain kinds of food available here, with the change of the seasons, but this is met in many instances by accommodation of the animals to new food sources. In general, food in this habitat at Point Lobos is more abundant through the winter than in the summer months. Consequently there is greater activity and a greater amount of vertebrate life here in winter than in summer.

In general, animals which are active in this habitat in the daytime are subjected to more extreme physical conditions than in other parts of the vicinity. The light is more brilliant; on warm days it is hotter; on cold days it may be colder; the wind is stronger here than where the plants are taller. Most of the grassland at Point Lobos has been cultivated at some time in the past, and at the time of our study the several tracts represented various stages toward recovery of a stable vegetation. Of all these, the area adjacent to Carmel Cove was disturbed last; it had been plowed and planted to oats only a single season before the State acquired it for park purposes. In November 1934, this ground was nearly bare of vegetation, only the stubble remaining from the single hay crop that had been removed during the previous summer. A corresponding set of features was supplied by the nearly bare surface on roads, on drifting sand, on small bits of rock outcrop, on patches of newly burned ground such as was left by the fire on September 26, and on artificially cleared fire trails.

Nearly all these bare places had some sort of supply of food—seeds or insects, but they possessed a more distinctive character, a freedom from obstruction that might hinder movement or vision. Several kinds of birds were so closely dependent upon these situations as to be present only as long as food was available. Other kinds were only partly dependent upon open ground. The former group includes the killdeer, horned lark, pipit, and Brewer blackbird. Mammals, for the most part, avoided these extremes of bareness.

It seems remarkable, even though it is commonly observed elsewhere, that the first cover of vegetation to grow on the artificially cleared ground was the tallest and thickest assemblage of grassland species in combination with tall herbaceous plants. First to reach full growth on the stubble ground was a cover of mustard and radish. Later in this first season these plants were partly replaced and the spaces between them filled by a dense stand of volunteer oats. The abundant crop of seeds thus produced immediately attracted large numbers of seed-eating birds, mainly sparrows, including linnets, purple finches, pine siskins, goldfinches, white-crowned

sparrows, and Lincoln sparrows. By the time the oats had matured, a colony of red-winged blackbirds settled in the tract and stayed through the nesting season. When still other kinds of grasses became predominant the Savannah sparrows increased until they were conspicuous.

Moles and pocket gophers appeared to be the first mammals to occupy ground free of its vegetational cover. During the first year of recovery, however, a large population of meadow mice and harvest mice invaded the new cover of plants. Ground squirrels settled there late in the following summer.

Several patches of grassland appeared to represent late stages in development of a fairly stable cover of plants. On these, for example the ground south of Blue Fish Cove, and the mound meadows, the plant growth was more strictly of native grasses, which grew to intermediate heights, although the average height was greater in 1935 than it probably had been for several preceding seasons. On this ground the meadowlark was the most conspicuous vertebrate. It was limited closely to this kind of habitat and was present in large numbers throughout the year. One other bird species, the Savannah sparrow, was resident here, but in small numbers. Other species foraged regularly over this kind of grassland, but in each case it was only a temporary occupancy; it was usually merely for foraging for food.

Sign of the presence of mammals on this third type of grassland was markedly reduced from the intermediate, early stages where the plant cover was so luxuriant. However, in spite of this scarcity of mammals on the older stages of grassland, our final estimate for all the grassland is that mammal workings were extensive enough to disturb every bit of the surface of the soil to a depth of close to one inch. The abundance of food, on the grassland in Point Lobos Reserve, resulted in a comparatively huge mammal population through 1935. This is largely traceable to the removal immediately prior to that season of the several kinds of artificial interference with the wild vegetation, mainly grazing and cultivation of the soil, that had been effective in previous years. (See pl. 5 fig. B, pl. 6, pl. 7 fig. A.)

Brushland

The brushland at Point Lobos constitutes an important division of the habitat for vertebrates both as regards area and variety of situation. Although in many features it is intermediate between the forest and grassland, it seems to be more variable in some respects than either of them. It differs from the grassland conspicuously by great increase in habitable volume above the surface of the ground and a decrease below the surface. The content of this habitat is crowded much nearer the ground than in the forest and it is generally more densely filled with limbs and the foliage of the plants. The conditions here favor those animals which have restricted

Fig. A—Brushland plants on sandy ground southeast of Point Cove. Many plants in this area blossomed in September and attracted swarms of insects, which in turn supported numerous birds which happened to find this spot in their fall wanderings. In breeding season this was location of many nesting pairs of white-crowned sparrows. Photographed on December 14, 1934.

Fig. B—Clump of baccharis at south base of Vierras Knoll. This plant contributes a great deal to the chaparral on the Reserve, with screen and shade and forage opportunity furnished in its foliage. Photographed on December 14, 1934.

Fig. A—Southeast side of Whalers Knoll viewed from southwest. The variety in habitat conditions represented here ranged from level grassland to chaparral- and woods-covered slopes, and it supported a correspondingly varied lot of animals. Spots like this one were crowded centers of animal activity. Photographed on December 14, 1934.

Fig. B—Slope southeast of Whalers Knoll. Here ceanothus was conspicuous in the tall chaparral and most plants of it were old ones; some of them already dead were beginning to fall apart. Photographed on December 14, 1934.

Fig. A—South-facing chaparral-covered slope near base of Cypress Point. The mixed stand of tall, close-growing ceanothus, poison oak, sage-brush, and other bushes provided a varied habitat which attracted many kinds of birds and mammals. Several vagrant species were seen at this place only. Photographed on December 10, 1934.

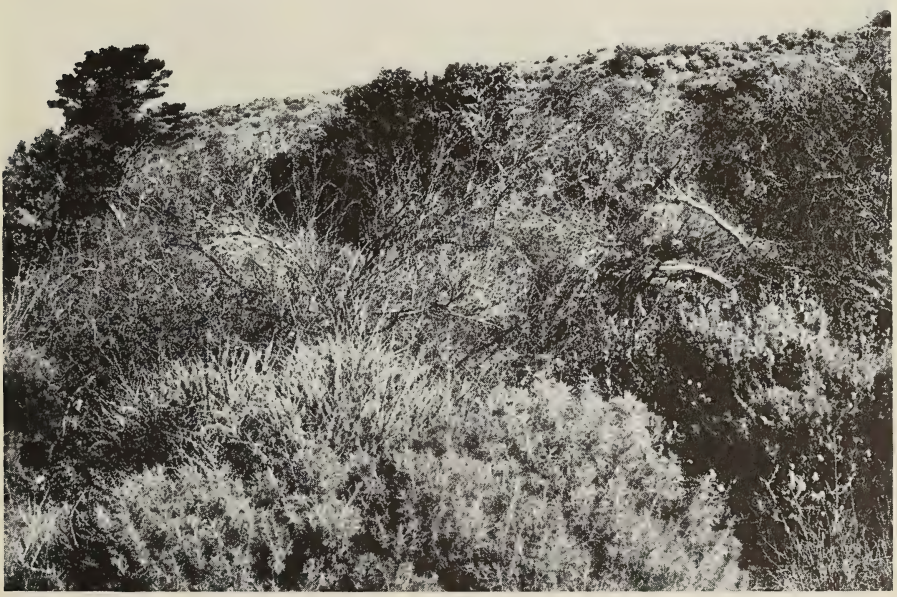

Fig. B—Patch of dead ceanothus on south slope of Whalers Knoll. This area was as thickly populated with vertebrate animals as any bit of brushland in the Reserve. Two features, thick layer of duff and bare exposed branches, made this patch especially attractive to certain birds which would surely have been present in lesser numbers without it. Photographed on February 24, 1935.

Fig. A—A live oak within pine woods in a ravine east of Mound Meadow. The heavy growth of lichens (*Ramalina reticulata*) so prominent on these trees served many birds as a screen for nest sites and as material for nest building. Photographed on January 6, 1935.

Fig. B—Live oak thicket just north of margin of pine woods. White-crowned sparrows roosted and nested here and several other species sought temporary refuge in this type of situation. Photographed on December 13, 1934.

power to escape from pursuit and the ones which are accustomed to capture prey by making short dashes.

Poison oak grows in this area in the pine woods as a small straggly bush and as a vigorous climbing vine on the trunks of the trees. In the more moist, shaded spots in the chaparral it is conspicuous among the other bushes and herbaceous plants, sometimes growing in nearly pure stands. Except for the screen which it provides, and the food supplied in small amount by its fruits, this plant seemed to be of little direct use to the vertebrates. The loss of the leaves in late summer left only the slender upright stems which offered little protection for animals. As a rule they were not especially suitable either as perching places or nest supports.

Another brushland plant of rapid growth and medium height was conspicuous in certain open spots close to the shore. This was the bush lupine which is characteristic of the narrow coastal strip of California. It, too, appeared to grow largest in the moister ground, but its occurrence was generally in more exposed, wind-swept places. Several extensive patches grew on the Reserve, for example on the sandy ground near Point Cove and in the southern end of the area. Many bushes in the latter patch were leafless during the time of our study. This plant produced extensive foliage and an abundant supply of large seeds which at the same time furnished screen and food for several kinds of birds. The usual branching form, with crotches one and one-half to three feet above the ground, made especially attractive nest sites for white-crowned sparrows. Many birds in winter foraged in the leaf-litter on the ground beneath these bushes. The exposed tops were used consistently by many birds—among them phoebes, bluebirds, and shrikes—which seemed to favor lookout perches of their height.

Several other kinds of low shrubs were conspicuous in the landscape here. Most of them grew in mixed stands, the type of growth at each place depending upon such factors as the kind of soil and nature of exposure. Among these are the following: *Artemisia californica, Baccharis* (2 sp.), *Diplacus aurantiacus, Ericameria ericoides, Eriogonum parvifolium, Eriophyllum* (2 sp.), *Symphoricarpos mollis*. All of these and some others supplied items for the needs of vertebrates, including screen, perching places, nest supports, and added food supply. Animals ate the bark, roots, foliage, flowers, in fact all parts of these plants, as also other, smaller animals (mainly insects) that had been attracted to them or were supported by them. The bushes also modified to some extent the physical conditions, as by providing shade and cutting the force of the wind; their presence thus modified the habitat available to certain of the animal types.

Ceanothus is not only the largest and most conspicuous of the brushland plants at Point Lobos, but it is related to vertebrate animals in more ways than any other one shrub. The species which occurs here (*C. thrysiflorus*) grows as single scattered bushes or as a dense thicket of large extent. The plant usually forms a rounded, or wind-flattened, bushy canopy, but some-

times, in sheltered places, it becomes a small tree fifteen feet or more in height and with a distinct trunk. It grows in dry situations, mostly on the tops of the ridges and hills and on slopes exposed to the south or west, but not on the driest ones. The foliage stays green throughout the year, but it is densest after the new leaves come out in the spring.

Where ceanothus grows within the pine woods it forms a loose-branched, straggly bush, with few leaves, which has little or no usefulness for birds or mammals.

Aside from the shade and screen supplied by ceanothus thickets in large amount, this plant furnishes food for many species. The foliage and stems are cut by rabbits. Insects which live on the leaves and flowers are sought by many kinds of small birds. The fruits are eaten especially by purple finches. In the thick layer of leaf-litter beneath the plants the fox sparrows, spotted towhees, thrashers and hermit thrushes find profitable foraging. This is probably the most important factor in determining the presence of many individuals of these species on this area and it affects the major portion of their activities there. (See pl. 7, fig. B; pls. 8-10.)

Forest

The segments of forest represented at Point Lobos are notable for several reasons. In the first place remarkably few kinds of trees enter into their composition. Only three species are represented in sufficient numbers to have a bearing on vertebrate animals. The cypresses and Monterey pines are segregated so as to form two distinct types of woods. Important differences were noted in the responses of animals to these two types of forest. The live oaks are scattering and occur mostly in association with the pines.

It may be that neither of the conifers is fairly representative of its species in this area. However, we have seen only little indication that this factor affected the relations between the vertebrate animals and the forest.

The trees here provided the accommodations, for animals, usually associated with trees of any sort. These include the resting places, forage situations, and breeding sites above the ground, as well as increased protection from the elements—light, wind, and rain. In other words, trees add greatly to the habitable volume of the environment for many birds and mammals. This applies to species which occupy other divisions of the habitat and also to some which are restricted to the trees.

An important feature of the forest here which owes its presence to nearness of the ocean is the abundant growth of lichens, especially *Ramalina reticulata,* which hang from the limbs of nearly all the trees. This mass of plant material grows luxuriantly where the fogs sweep most frequently through the trees. It provides screen and cover for birds and the animals upon which some of them feed. Its most important use by birds, however, is for nest-building materials. A majority of the nests on the Reserve are composed mainly of this material, which is so abundant that little time is

required to find it; from the bird's point of view it seems ideal for nests of such species as bush-tit, Hutton vireo, and linnet. It seems probable that presence of this nesting material may have been an important factor in the large size of the nesting population of some species.

Live Oak—In the coastal districts of California the live oak is one of the distinctive trees which plays an important part in the lives of many kinds of animals. At Point Lobos, however, it is present in such small numbers as to affect relatively few individuals. Nearly all the live oaks on the Reserve are small trees. They are mostly scattered through the pines close to the eastern border of the Reserve, south of Rat Hill. A few are located near the northern margin of the pines west of the Warden's House. One group of seven trees grew off by themselves in the extreme southeastern corner of the Reserve, between the highway and Gibson Creek. These were the largest oaks in the Reserve, some approaching thirty feet in height and possessing large, well-rounded crowns.

Another form of this tree, more reasonably perhaps considered as a type of bush, was exemplified by low dense thickets around the edges of the tracts of pines. These thickets, sometimes thirty feet or more in diameter and only five or six feet in height, are really tops of oak trees flattened out against the ground. However, they attracted a different set of vertebrate inhabitants from the one usually characteristic of this tree. Thickets of this type grew at several places around the bases of pine trees. The effect of this bushy growth upon vertebrates can perhaps be indicated best by a list of the species most often found there, which includes valley quail, white-crowned sparrow, song sparrow, Bewick wren, and spotted towhee. (See pl. 11.)

The influence of oaks upon the animals in the Reserve was considerably greater than their numerical proportion would warrant. One possible explanation for this may be that the year-round presence of their green leaves provided a more plentiful and continuing supply of insect food than the same number of coniferous trees would provide. The screen furnished by the foliage was denser than that of the pines, but much less than that of the cypresses. The foliage of the oaks was an especially favorable feeding situation at the time of flowering in the spring. Numerous pits on the stems revealed winter feeding activities of sapsuckers. In the fall, California jays carried acorns from these trees. Gray squirrels ate the acorns.

Oak trees were selected for nesting sites by wood rats, California jays, Allen hummingbirds, and bush-tits. The last-named species carried parts of the oak flowers to coat their nests on the outside.

Pine—The predominant tree species at Point Lobos is the Monterey pine. Here in places this tree grows in almost a pure stand, being mixed scatteringly with live oaks on the landward side of the area and with cypresses on the ocean side near the north shore. The woods are not in a stable condition, probably because of the fires, wood chopping, and grazing by

livestock to which they have been subjected in the past. Also in this connection should be considered the marginal position of the stands on the Point Lobos Reserve, where they are possibly subjected to some extremes of physical conditions which may not be wholly favorable to the species.

Pines on this area occur mostly in close-growing stands of spindling trees with thin trunks and small tops. There is impressive uniformity in height and trunk size. The forest floor in most of this type tends to be bare of other kinds of plants. On the margin of the woods, especially toward the west, the stand is more orchard-like with spaces between the trees, these being large and spreading. The lower limbs are long, more nearly horizontal, and some may reach to or nearly to the ground.

When side branches break off from the pines, they tend to leave stubs which vary in length from a few inches to several feet. These stubs are attractive to animals in several ways. They provide perching places where there is good visibility through the woods and at the same time screen is assured above by the crown of the tree. Western flycatchers build their nests on these stubs, and pigmy nuthatches find suitable locations in them for excavation of their nesting cavities. Gray squirrels carry food from the ground to these stubs, to gain added safety as they feed. Bluebirds use them as lookout perches in scanning the floor of the woods for food.

The fallen trunks and limbs, even the very small ones, are sought out and tunneled under by many animals, especially meadow mice. Amphibians and reptiles find moisture, darkness, and concealment under the logs more often than in any other situation in the Reserve. The larger accumulations of brush and the dead tops of fallen trees are used by those animals which need perches and concealment close to the ground and accessible to shade. Some of these are Bewick wren, junco, valley quail, and black phoebe.

Many kinds of birds and some mammals find suitable nesting sites among the branchwork of the pines. Nests of bush-tit, Hutton vireo, Brewer blackbird, linnet, pine siskin, green-backed goldfinch, Oregon junco, and chipping sparrow were seen on limbs of living pines, mostly well concealed in the foliage toward the ends of limbs. The only nests of gray squirrel seen in the Reserve were in pine trees, usually in a crotch or on a main limb near the tops of the trees.

Pines at Point Lobos furnish food directly to gray squirrels in their seeds, and indirectly to many birds in the insects on and in the bark, in the wood, and in the foliage. The dead wood functions as importantly and as often as other parts of the tree in producing food of this sort. However, because probably of the proximity to the ocean, decay and disintegration of the wood is rapid in this locality, so that replacement by new growth must be rapid if this type of material is to be maintained in amounts sufficient to support a substantial population of the animals whose presence depends upon it. (See pls. 12-17.)

Fig. A—Margin of pine woods on east side of Mound Meadow. Contrast variety in plant form present here with uniformity of two types shown in figure B. Many avian species and individuals lived along this stretch of marginal woods. Photographed on December 12, 1934.

Fig. B—Grove of tall spindling pines north of Warden's House. This illustrates kind of stand used least by vertebrate animals in the Reserve. The wild radish patch in foreground was a productive forage area for large numbers (but few species) of birds and mammals. Photographed on February 24, 1935.

Fig. A—Grove of pines north of Warden's House. At stage shown here the trees are about as unfavorable for vertebrate animals as they could be. Dead trunks and limbs have been removed, along with every trace of shrubby growth and brush (except a few small piles) on ground. The only facilities left for birds are in the high, meager crowns, where wandering flocks of small birds found suitable forage. Photographed on May 20, 1935.

Fig. B—Floor of pine woods. Here, absence of bushes and of accumulations of brush markedly restricted the usefulness of the woods for birds. Inhabitants of the low strata were nearly absent. Photographed on December 12, 1934.

Fig. A—Open stand of pines near western border of woods. More kinds of birds inhabited this type of tree growth than close-growing type shown in figure A plate 13. Brewer blackbirds, linnets, mourning doves, and chipping sparrows showed distinct preference for nesting sites in trees of this type. Photographed on October 21, 1935.

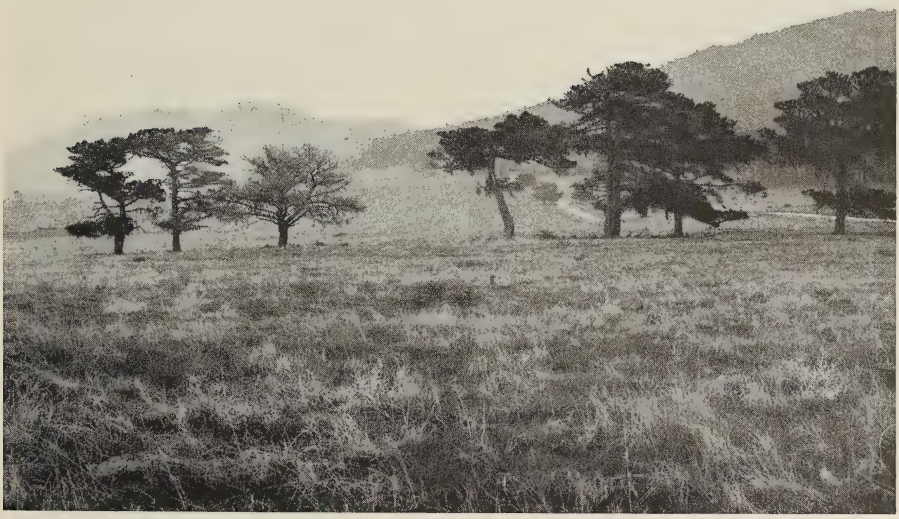

Fig. B—Row of pine trees extending across grassland from north side of main tract of woods. Very many birds were seen to center their activities in and about this row of trees. It probably served more individual birds in a year than any equal number of trees on the Reserve. Photographed on December 12, 1934.

Fig. A—Pine tree surrounded by grassland north of Warden's House. Many kinds of birds which fed in neighboring low vegetation used this tree as a refuge or for exposed resting perches. At least two species, valley quail and white-crowned sparrow, regularly roosted in the foliage. Photographed on December 11, 1934.

Fig. B—Standing dead pine at margin of woods north of Mound Meadow. Types of use for such a tree were exemplified on part of woodpeckers and nuthatches which foraged over its surface, of linnets and Brewer blackbirds which perched where they could absorb sunshine, and of shrikes, sparrow hawks, and western bluebirds which used it for a lookout post whence they could survey the surrounding ground for food. Scars in turf in foreground show ill effect of an off-the-road automobile. Photographed on December 12, 1934.

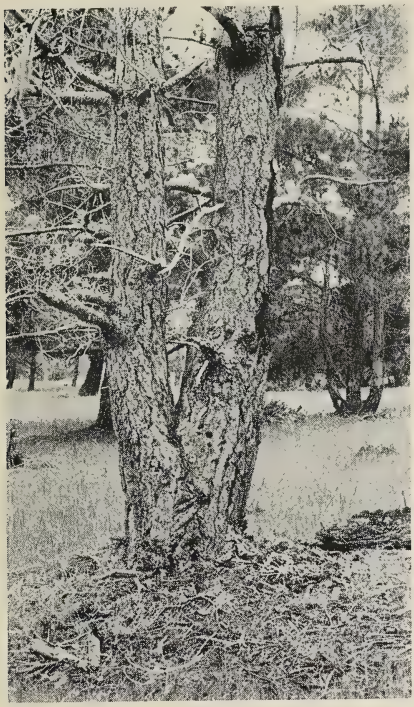

Fig. A—Nesting hole (lower one in left bole) of chestnut-backed chickadee in pine north of Mound Meadow. This site was in an extremely open type of situation for this kind of bird; usually the cavity was closely screened by pine foliage. By nesting at this or a lower level, this bird avoided the pugnacious pigmy nuthatches which lived mostly higher in the trees. Photographed on April 14, 1935.

Fig. B—Fallen dead pine at margin of woods east of Mound Meadow. This and near-by standing trees show kind of stubs left when dead limbs fall from Monterey pines. The marginal location of this tree added considerably to its usefulness; it was accessible to both forest and grassland species. Photographed on December 12, 1934.

Fig. A—Log and rotting stub of pine in western part of woods. Brown creepers nested in a cavity in the stub. The exposed situation makes this log less suitable for log-inhabiting vertebrates than one shown in figure B. Photographed on December 12, 1934.

Fig. B—Log among pines on west side of Rat Hill. Here, surrounding growth of plants helps to provide added concealment and moisture for salamanders, lizards and other animals which require a situation like this one. Photographed on December 13, 1934.

Fig. A—Cypresses near tip of Cypress Point. These last tree outposts toward ocean provided perching places for many wandering birds which turned back landward after reaching this extreme limit of trees. Linnets nested in these exposed trees. Photographed on October 21, 1935.

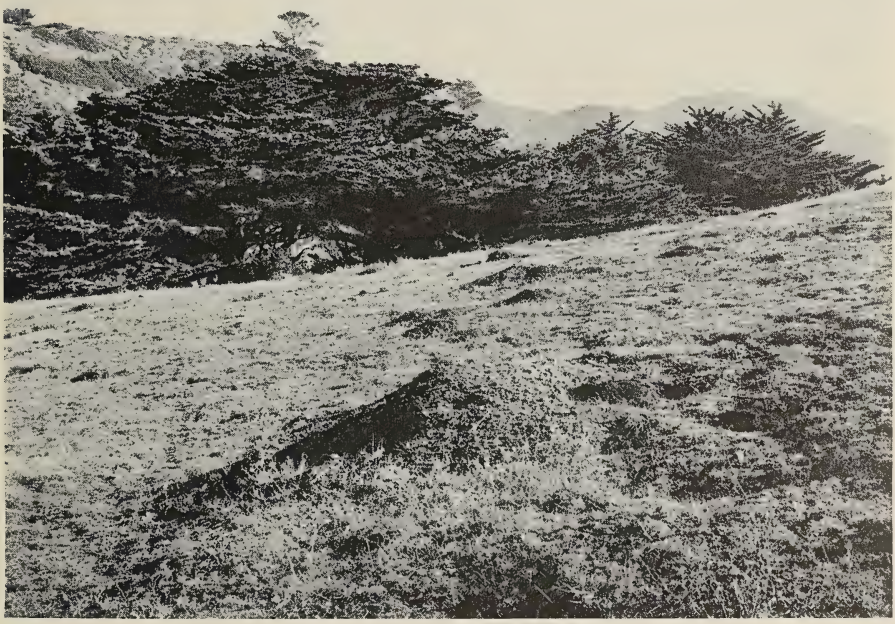

Fig. B—Pocket-gopher mounds (fresh) and ground squirrel mounds (old) close to north shore near base of Cypress Point. Although these mammals were abundant in openings between groves of cypress, they were practically absent from ground beneath trees. Photographed on December 10, 1934.

Fig. A—Old cypress on verge of bluff north of path between Cypress Point and Little Dome. Many roots from this tree were exposed on cliff face; its two main trunks had been wired together. A family of ground squirrels lived, in summer of 1935, in crevices about the roots of this tree. Photographed on December 28, 1934.

Fig. B—Cypress trunks and floor of woods within grove on Cypress Point. This dark, moist habitat was nearly devoid of small plants and it was occupied normally by only such birds as junco and hermit thrush on the ground, and chestnut-backed chickadee on the limbs. Photographed on December 13, 1934.

Cypress—The presence of the Monterey cypress is responsible more than any other single circumstance for the selection and maintenance of Point Lobos as a State park. The extraordinary interest in the grove of this kind of tree on the Point is sufficient incentive for careful examination of its relationships with animals. For this reason we paid close attention to all the vertebrates found within the cypress grove.

It was somewhat of a surprise to find that few species of vertebrates are satisfied with the cypresses for living quarters. The extremely dense foliage of the trees and the heavy tangle of branches present an almost solid wall which few animals cared to penetrate. They also made so heavy a shadow below, that a ground cover of smaller plants was sparse or lacking entirely. Under the trees juncos (year round) and hermit thrushes (winter) foraged; within the densest branchwork winter wrens foraged. Several more species—including chestnut-backed chickadee, bush-tit, pigmy nuthatch, red-breasted nuthatch, Bewick wren, ruby-crowned kinglet, Hutton vireo, Audubon warbler, Townsend warbler, linnet, and junco—fed among the more open portions of the tree tops. Of these the only one that seemed to show a preference for cypresses over the pines was the Townsend warbler. In the migration seasons and in winter one or more groups of this bird could be found nearly always in the cypresses.

Nests of three species were found among the branches of cypresses. Many pairs of linnets and a few of bush-tits nested in the foliage. One junco nest was found on a horizontal limb of cypress. Wood rats commonly built their nests among the limbs of cypresses. One chickadee nest was discovered in a cavity high in a dead cypress trunk.

The tall dead trunks of cypress which projected above the tops of the surrounding live trees were favorite perching places for many kinds of birds, among them flycatchers, woodpeckers, hawks, and linnets. These and other species came singly or in flocks and rested for long or short time on these elevated perches. The small group of dead cypresses in the eastern part of the grove thus attracted more kinds of birds than all the living cypresses combined. Apparently this tree is useful to more kinds of birds after it dies and loses its foliage than at any time during its life. (See pls. 18-20.)

Ocean Shore

All the land on the oceanward side of the highest line ordinarily affected by wave action is here considered as shore. At Point Lobos it includes sandy beaches, bluffs, and small rocks and islands offshore. The total amount of this kind of habitat is small, but this is the part of the Reserve most frequented by human visitors, and also it makes a rather large contribution to the avifauna.

The sandy beaches, such as at Gibson Beach, China Beach, and Point Beach, mostly extend for only a few yards. They serve mainly as resting

and forage places for gulls and shorebirds. Coons frequently come into the Reserve and forage along the first-named beach.

Most of the shore consists of the wave-eroded bluffs of conglomerate or granite. These bluffs vary from a few feet to over 200 feet in height. Sometimes they are broad, flat shelves, as at Pebble Beach and the tip of the point toward Seal Rocks, and sometimes they are vertical or even overhanging cliffs. Turnstones, oyster-catchers, and other shorebirds, as well as such land birds as Audubon warbler and black phoebe, foraged here regularly. Pelagic cormorants roosted and nested on certain nearly vertical conglomerate cliffs, as also did cliff swallows in large numbers, at least one pair of black phoebes, and probably a pair of duck hawks. This use evidently resulted directly from inaccessibility of the sites to disturbing agents, along with the suitability of the niches and shelves for supporting the nests.

Islands close to the shore were numerous and varied, from small rocks that were covered at every high tide and by large waves, up to islands sufficiently large and high to be always above water and even to retain a top soil and support growing plants; on one island was a medium-sized pine tree. The low, small islands when exposed were foraged over by gulls, turnstones, and oyster-catchers.

Several islands supported nesting colonies of Brandt and pelagic cormorants, and pigeon guillemots, and the largest one, Bird Island, near the southern boundary of the Reserve, was permanent headquarters for a colony of brown pelicans. Several pairs of black oyster-catchers and many western gulls nested on the islands. The second largest group of islands, known as Seal Rocks, was the hauling-out place for a large herd of Steller and California sea-lions. Again, the factors of safety and conveniently available food seemed to account for the presence of these animals. (See pls. 21-22, pl. 23 fig. A.)

SUCCESSION

Under the topic succession we aim to consider those qualities of the fauna of Point Lobos which have to do with change in its make up, mostly in order of time. This includes seasonal change as well as that dependent on changes in the environment resulting from other causes. Only the more plainly obvious trends and the conspicuous causes of them are mentioned, but these are sufficient to show the importance of examining this phase of the animal life in the area.

At the beginning of our work, on November 18, 1934, the new grass was starting vigorously on open ground, coming up through the matted last-year's layer. On the visit near the end of November the soil had been settled by previous rains, but there was much evidence of rodent working since the last rain. Grass and other plants were coming up over most of the mounds. Many small piles of dead brush had recently been accumulated beneath the pine trees in activities concerned with cleaning up the

Fig. A—Cypress foliage in detail. Few kinds of birds foraged in this kind of thick mass. In winter, Townsend warblers and juncos were most conspicuous ones here. Many linnets nested in ends, and on lower sides, of the thick boughs. Photographed on December 13, 1934.

Fig. B—Margin of cypress grove near base of Cypress Point. This part of grove was exposed to east and was frequented by more birds than were other sections of the cypress woods. The dead tops projecting above general level of living trees attracted many birds to perch. Photographed on May 20, 1935.

Fig. A—Part of southern shore of Reserve near Mound Meadow. Shorebirds foraged along beach here more than at any other place in Reserve. Here occurred the widest intertidal belt of land. The conglomerate outcrop in distance included nesting site of a pair of killdeer. Photographed on May 20, 1935.

Fig. B—Outer shore of Big Dome and Little Dome. Somewhere above reach of waves and in a place not generally accessible to persons, a pair of duck hawks centered their interests. Photographed on October 21, 1935.

Fig. A—Conglomerate cliff on south shore near base of Sea Lion Point. Beneath projecting ledges near top a large colony of cliff swallows nested. Pelagic cormorants roosted on face of cliff, and at least one nest was built there. Photographed on May 20, 1935.

Fig. B—North shore of Point Lobos looking westward from east side of Blue Fish Cove. The bluffs here are much higher and generally steeper than on south shore. Big Dome shows in distance. The island was occupied, in season, by nesting colonies of pelagic cormorant and pigeon guillemot. Photographed on September 25, 1935.

Fig. A—Bird Island and vicinity, from north side. The largest island was permanent home of a colony of brown pelicans. Each of the four smaller islands shown to right of that one was occupied by Brandt cormorants. The large island is close enough to shore to permit watching nesting activities. Photographed on May 20, 1935.

Fig. B—Brush pile in pine timber, accumulated by workers during clean-up activity in woods. When these artificial thickets were left, they immediately were occupied and used as refuge places by several kinds of low-stratum inhabiting animals which otherwise would have been present in smaller numbers or only in other parts of Reserve. Photographed on December 13, 1934.

woods. They were slightly conspicuous, but it was anticipated that they would soon weather down, and even then they provided needed routes of travel and stations for several kinds of birds. At this time it appeared as though there were too few carnivores in proportion to the smaller animals —and this might well be expected after the sudden release of cultivated and pasture lands from economic uses. November 30 was sunshiny and warm, with the air full of insects—a great day for fly-catching birds. (See pl. 23 fig. B.)

In mid-December the meadow mice appeared to be slightly less numerous than in November, but this might have been due in part to the recent growth in vegetation which obscured the runways. At this time of year when most of the days were rainy, few birds were active and it was hard to see the ones that did move about. The rain melted down all the rodent workings. The softer earth spread, leaving the stones and gravel in conspicuous relief on the mound surfaces where the forces of weather could reach them. On December 28 plants were sprouting on many of the gopher and ground squirrel mounds. No place could be found where a gully had started by erosion at a rodent working.

Observations were made in the vicinity of Bassett Avenue on February 22, a few days after this old roadway had been plowed up. Then it was being harrowed to level off its surface with the adjacent land. Certain brush piles near there in December had been removed—only one remaining, but no more of the scattered trees had been cut. The freshly plowed and harrowed tract of ground was especially attractive to western bluebirds, juncos, Audubon warblers, and Brewer blackbirds. (See pl. 24.)

The radish patch north of the Warden's House was examined on February 22. The standing water present in January was gone and the herbage was very lush, the radish was in abundant bloom and a new crop of radish pods coming on—many showing bill-marks of birds. Evidence of meadow mice was abundant in this area and a nest built by a harvest mouse was seen, but there was no sign of gophers—perhaps the ground was yet too soggy—though much new gopher sign was detected north of there on stubble-covered ground.

Impressions gained from four days, February 21 to 24, in the Reserve were that, compared with December, the total bird population had decreased decidedly—more, perhaps, than was accountable from regular mortality causes (hawks, owls, accidents). This reduction was from shifts of some species out of the Reserve; notably flicker, killdeer, siskin, white-crowned sparrow, hermit thrush, black phoebe, Audubon warbler, and pipit. On the other hand, linnets seemed to be more numerous, though perhaps in part because then scattered and singing. Robins and Brewer blackbirds were more in evidence.

When the Reserve was visited on February 18, the day was warm and clear and there was little wind. Birds were notably conspicuous, and they

were noisy and active. The flocks of earlier winter seemed to be breaking up and, at least in many instances, the birds obviously were paired. Many species that had been present in November and December seemed to be absent. The next day was partly cloudy and cooler and the birds were less active, but there was much evidence of beginning of nesting. Nearly every species showed a change in behavior from the mid-winter season. The third day was still colder and more of the birds were in flocks, but the preceding warm weather had certainly caused a shift in numbers and especially a departure from this area of many winter visitants.

Exactly one month later (March 18) the birds seemed not much more advanced in nesting than was the stage reached in February. The flowering season of the radish and mustard plants seemed to be nearly over. Many of these plants had about half their seed pods empty, presumably emptied by birds.

During four days spent here, ending on March 31, the nesting cycle of most resident birds was in only early stage. Most birds were still merely prospecting for sites. This was especially true of western bluebirds. Thrashers and bush-tits were perhaps farthest along. Impressive was the dominance of linnets—everywhere, along sea-bluffs, in woods, and especially in mustard patches. This new food source, with ripening seeds, may have accounted for the increase in linnet population. Some summer visitants had arrived, including Allen hummingbird and several kinds of swallows. Winter visitants were decidedly fewer in numbers of individuals than in mid-winter, for example, only one each of black and Say phoebe was seen in the four days. It was thought that there were fewer individuals of all birds in the aggregate than in mid-winter. The great falling off in white-crowned sparrows, hermit thrushes, and Audubon warblers more than equalled the increase in linnets and other, newly arrived species.

A rainy spell in the middle of April lasted several days. Most of this time birds were actively foraging, but there was little behavior that indicated nesting. On the third rainy day (April 15) birds were more active in protected places in the woods than they had been previously. At this season the birds were markedly inactive in the afternoon; possibly with the coming of longer days the energy of the birds was used up by mid-day. It was not particularly hot, cold, wet, or dry in the afternoons here, compared with the mornings, so that no change in the physical surroundings was apparent to account for the change in behavior.

In mid-April the top layer of soil over most of the area was still saturated with water, and water stood in pools on the surface between mounds, both in meadows and in timber, making the mounds in the timber as noticeable as those in the open. In the timber there was more vegetation in the depressions than on the hummocks. Nearly every place where a road traversed a slope showed a ditch that had been cut by winter rains;

but we were still unable to find any cutting near, or connected with, any rodent working.

On April 16 it was observed that the food supply on the area was much greater than the needs of the birds and of the other sorts of vertebrates. This included the green portions of plants, seeds, insects whether on plants, on the ground, or in the air, and the smaller kinds of vertebrates. Moreover there had been an oversupply of food since the previous November, even considering possible preferences of the birds for certain kinds of food. This factor then could scarcely have been one which limited the number of animals in the Reserve at that time. Numbers of some kinds of animals might have been limited because more individuals had not yet found the place. Factors active in limiting their populations in general, more or less distantly, must have played the major rôle.

Flocks of migrating shorebirds were seen on April 23; and the next day more migrating sea birds were noted than on any previous day.

By April 24, the ground in the Reserve was drying rapidly. Much of the grass was hard and beginning to turn brown. The ceanothus practically had finished blooming. The cool days of early May seemed to check the drying of the plants so that they looked as green or even greener on May 11 than they had on May 2. However on the 11th the ground was dry and there was no running water. Plants were still growing noticeably and although many kinds had passed their season of flowering, many others were in abundant bloom. These included yellow bush-lupine, diplacus, and lavender bindweed. Many grasses and composites were going to seed—yielding a huge crop.

The nesting activities of birds at this location increased more and more rapidly through the spring, to reach a peak early in May and to decrease abruptly shortly after the middle of that month. A curve representing this would be paralleled closely by a curve representing changes in the population of insects. Our notes indicate a sharp decrease in numbers of birds in the Reserve immediately after the peak in the nesting season. Some species, including red-winged and Brewer blackbird, the linnet, and the swallows, evidently moved completely out of the Reserve as soon as their young were out of the nest and sufficiently able to fly. Apparently a large proportion of those birds which depend upon insect food through the summer go to other regions when the dry season depletes the insect supply here; but they appeared actually to leave before they were forced out by shortage of food. Possibly the insectivorous birds bred here in spring and early summer contribute to the upslope, mid-summer movement observed widely on the mountain ranges more or less far from Point Lobos.

At the time of our visit on August 10 and 11, the annual vegetation was nearly all dead and in its driest, brownest stage. Rodent activities were markedly apparent. A large proportion of the stems of grasses and herbaceous plants had been cut to pieces. Freshly excavated earth had covered much of the dried grass. Many vertical, summer-burrows of pocket gophers

permeated the open terrain everywhere, rendering the ground quickly absorptive to first autumn rain water. At many places the ground appeared nearly bare as a result of these activities of mammals. Numbers of birds were still at a low stage and those that were present were inconspicuous by being quiet and reclusive.

The period from September 15 to October 15 was one of re-establishment of the winter bird population. Many species that had been absent for part or all of the summer returned. There was some indication, though slight, of the southward migration of land birds. Many groups of individuals of species that had been present in small numbers visited the Reserve, but for only a short time. Several species showed up, usually singly, which had not been detected previously. Winter-visitant species arrived from outside the Reserve. These changes accompanied a second peak in flowering of some plants which bloom in the fall. Also there was a noticeable increase in insect life over the mid-summer condition.

By October 22, birds seemed to be well settled for the early winter. The flocks and single ones had their regular forage beats well established. A great many ocean birds, mostly gulls, were moving back and forth past the Point and feeding in the water. Some migration was noted on the ocean in southward direction, but none was detected on land.

Rains had fallen and grasses were up and showing green rather evenly over nearly all of the Reserve. Most of them, however, were still under two inches in height, so that the remains of the growth of the previous year partly hid them from view. At this season few animals were seen eating the green vegetation. Possibly the appetite for green material does not come until spring.

RELATIONS TO CULTURE

Influence of Human Activity upon Vertebrates

Human activity influenced vertebrates in the Reserve during the year of our observation only slightly. This influence was mostly an indirect one resulting from artificial modifications of the habitat. These sometimes resulted in removal or decrease of a species or series of species. Sometimes the same operation acted also to attract additional species or more individuals of those already present; at other times the result was merely a shift in daily routine. Changes of this nature resulted from the burning of a strip of grassland in late September, from cutting of certain trees and limbs of trees and the removal of dead wood, from the accumulation of piles of dead wood, from the scarifying of unused roads, and from the formation of a strip of bare earth for a fire break. Refuse left by fishing and picnic parties brought concentration of gulls and ground squirrels for food.

Directly, the presence of people along with their automobiles frightened small numbers of animals from their feeding and resting places; but the recovery was rapid so that the final result of such disturbance seemed to be almost negligible. In the roads we saw dead individuals of skunk, common

toad, alligator lizard, and killdeer that had been run over by automobiles. Airplanes frequently flew close to the ground, and caused much panic among some groups of birds.

Influence of Native Vertebrates upon Human Activity

In Point Lobos Reserve there is practically no possibility of injury to persons by wild vertebrate animals, nor is there any likelihood that any appreciable economic loss of any sort can be traced to the activities of these animals. On the other hand, the animals need not be considered directly beneficial to human welfare as measured in economic terms.

The influence of native vertebrates upon human activity is almost entirely one of affording greater opportunity to become acquainted with the true nature of man's normal surroundings. This is exercised by attracting attention through vision or hearing and thus influencing the procedure of persons through the Reserve and supplying them with materials for beneficial, thoughtful reflection.

ZONAL AND FAUNAL POSITION OF THE POINT LOBOS RESERVE

Point Lobos Reserve lies within the narrow coastal strip of California which sharply differs climatically from the territory adjacent to it interiorly. The features of the climate characterizing this coastal strip include relatively cool summers and warm winters (hence more equable annual march of temperature), and high humidity of the air at all seasons. The climatic influences upon the endemic plant and animal life are manifested therefore in two ways distributionally, as expressed in the designations Life Zone and Faunal Area.

The Life Zone of the Reserve is, in the terminology here employed, Transition. This zone is occupied by certain species of southern or Austral origin in association with certain species of northern or Boreal origin. Additionally, there are a few kinds present in this zone only, and hence diagnostic of it. Avoiding consideration of certain other species which are so widely distributed latitudinally as not to be zonally significant, and considering only the birds which are known to breed in or very near the Reserve, the following lists show our zonal appraisal of the vertebrate species.

The table (p. 26) shows a 60 per cent Austral element in the vertebrate portion of the Point Lobos biota, 26 per cent of Boreal, and 14 per cent of restrictedly Transition. The last percentage is fairly normal for Transition anywhere; for this zone is essentially merely one of overlap between Austral (or Sonoran) and Boreal (the latter in its Canadian division). The narrow Pacific Coast climatic strip of North America is solidly Canadian in the Sitkan district of southeastern Alaska, and almost solidly Upper Austral (Upper Sonoran) in the vicinity of San Luis Obispo, California; between these points, in southward direction, there is a progressive dropping out of Boreal forms and a replacement of these (with considerable abruptness in

southwestern British Columbia) by Austral forms. The position of Point Lobos, far toward the south in this strip, with all the implications of this position climatically and distributionally, doubtless accounts for the preponderance (60 per cent) of Austral species in its Transition Zone make-up. Even so, by reason of the large numbers of individuals of certain strongly Boreal species, the representation of this major zone at Point Lobos is impressive, especially to the visiting observer whose home is in the interior or in the southern part of California.

ZONAL ANALYSIS

Of Austral Relations	Endemically Transition	Of Boreal Relations
Myotis californicus	Sciurus griseus	Scapanus latimanus
Zalophus californianus		Eumetopias jubata
Thomomys bottæ		
Perognathus californicus		
Reithrodontomys megalotis		
Neotoma fuscipes		
Lepus californicus		
Sylvilagus bachmani		
Pelecanus occidentalis	Selasphorus alleni	Phalacrocorax pelagicus
Cathartes aura	Empidonax difficilis	Accipiter velox
Lophortyx californica	Tachycineta thalassina	Cepphus columba
Larus occidentalis	Sitta pygmæa	Dryobates villosus
Zenaidura macroura	Carpodacus purpureus	Cyanocitta stelleri
Geococcyx californianus		Penthestes rufescens
Speotyto cunicularia		Certhia familiaris
Aëronautes saxatalis		Wilsonia pusilla
Calypte anna		Spinus pinus
Sayornis nigricans		Junco oreganus
Aphelocoma californica		Zonotrichia leucophrys
Psaltriparus minimus		
Chamæa fasciata		
Troglodytes aëdon		
Thryomanes bewickii		
Toxostoma redivivum		
Vireo huttoni		
Carpodacus mexicanus		
Spinus psaltria		
Sceloporus occidentalis	Ensatina eschscholtzii	
Gerrhonotus multi-carinatus		
Pituophis catenifer		
30	7	13

As to the faunal position of the Point Lobos Reserve, using this term "faunal" in the restricted sense that the distributional restrictions upon the biota are exercised in part at least through atmospheric humidity, we see that, of course, it lies within the more or less humid, major Pacific Coast District of North America. Numerous species, and, in the case of birds especially, genera, attest this. Then within this major Faunal District, the Californian Faunal division of the Austral life zone is strongly represented,

less so the Northwest Coast Faunal division of the Boreal life zone—as already indicated. Further faunal subdivision is expressed in the term Santa Cruz Subfaunal Area; and this term has been applied to that portion of the Pacific Coast Transition lying south from the Golden Gate and San Francisco Bay more and more interruptedly to its southern terminus, somewhere on the coast of northwestern San Luis Obispo County. Point Lobos Reserve, then, lies in the Santa Cruz Subfaunal Area.

In order to present even a brief discussion of the faunal characteristics of any region, it becomes necessary to introduce the concept of the subspecies, that is, the geographic race. Although not one animal was killed and therefore not one specimen removed from the area of the Reserve by us during our year of intermittent observation, we are able to speak with confidence of the subspecies of the geographically variable species represented there because of the presence in the Museum of Vertebrate Zoology of adequate collections of vertebrate animals from neighboring territory. The senior author, in the years 1900 to 1902, collected many land birds in Monterey County, from the vicinity of Pacific Grove south to the valley of the Sur River; and these, and the field notes pertaining to them, now form a part of this Museum's research equipment.

Our analysis may now be carried forward, then, with subspecies taken into account, as also distributional limitation on the bases both of life zone and faunal area. Species widely tolerant of climatic conditions naturally are not so pertinent in this connection as those which are narrowly sensitive. From the Point Lobos list we select the latter category of species for special mention, and we restrict ourselves further to the mammals and birds.

Subspecies in the humid Pacific Coast District, of greatest restriction—that is, to occurrence mainly within the Santa Cruz Subfaunal Area:

Sciurus griseus nigripes Bryant. Black-footed Gray Squirrel.
Thomomys bottæ bottæ (Eydoux and Gervais). California Coast Pocket Gopher.
Perognathus californicus californicus Merriam. Central California Pocket Mouse.
Sylvilagus bachmani bachmani (Waterhouse). California Brush Rabbit.
Penthestes rufescens barlowi (Grinnell). Santa Cruz Chestnut-backed Chickadee.
Chamæa fasciata fasciata (Gambel). Intermediate Wren-tit.
Thryomanes bewickii spilurus (Vigors). Vigors Bewick Wren.
Junco oreganus pinosus Loomis. Point Pinos Oregon Junco.
Passerella melodia santaecrucis (Grinnell). Santa Cruz Song Sparrow.

Subspecies in the humid Pacific Coast District, of wider distribution, either to the northward (to include the Marin and even the Humboldt Bay subfaunal areas) or to the southward (to include the San Diegan Subfaunal Area) or interiorly (to include the San Francisco Bay Subfaunal Area):

Scapanus latimanus latimanus (Bachman). Central California Mole.
Neotoma fuscipes macrotis Thomas. San Diego Wood Rat.
Microtus californicus californicus (Peale). West-central California Meadow Mouse.
Otus asio bendirei (Brewster). California Coast Screech Owl.
Selasphorus alleni alleni Henshaw. Migratory Allen Hummingbird.
Cyanocitta stelleri carbonacea Grinnell. Southern Coast Steller Jay.
Aphelocoma californica californica (Vigors). Southern California Jay.
Psaltriparus minimus minimus (Townsend). Pacific Coast Bush-tit.
Sitta pygmæa pygmæa Vigors. Monterey Pigmy Nuthatch.
Certhia familiaris occidentalis Ridgway. Tawny Brown Creeper.
Nannus hiemalis pacificus (Baird). Western Winter Wren.
[Not surely nesting within the Reserve in 1935.]
Hylocichla guttata slevini Grinnell. Monterey Hermit Thrush.
[Did not nest, as far as we know, on the Reserve in 1935.]
Agelaius phœniceus mailliardorum van Rossem. San Francisco Red-winged Blackbird.
Pipilo maculatus falcifer McGregor. San Francisco Spotted Towhee.
Passerculus sandwichensis bryanti Ridgway. Bryant Savannah Sparrow.
Zonotrichia leucophrys nuttalli Ridgway. Nuttall White-crowned Sparrow.

Additionally, races of a few birds wintered in the Reserve, which are of rather close restriction at that season to the southern part of the humid Pacific Coast District:

Hylocichla guttata nanus (Audubon). Dwarf Hermit Thrush.
Dendroica townsendi (Townsend). Townsend Warbler.
[A short-winged population of this species.]
Passerella iliaca meruloïdes (Vigors). Yakutat Fox Sparrow.

Of this category, the hermit thrush and the fox sparrow were individually so numerous, and on many occasions so closely scrutinized by us, that we are confident that the majority, if not all, of the wintering population were of the subspecies indicated. Almost as pure and localized concentration in the wintering territory is thus indicated, as in the summering territory of these subspecies far to the northward, within the humid coast belt of southeastern Alaska.

Regarding the non-resident land birds in general, we found the "through" migrations surprisingly weak. In the main, only arrivals and departures became evident to us in spring and fall and these movements took place gradually over a period of many weeks: there was no migrational "rush" at all.

Some statements will here be made concerning the distributional behavior of certain of the more characteristic, permanently resident birds of the Point Lobos Reserve. These statements bring in the concepts of the various environmental units, from the Life Zone down through the Faunal District, the Faunal Area, the Subfaunal Area, and the Habitat (see p. 11), to the ulti-

mate unit of occupancy, the Ecologic Niche. Each of the latter ultimate units is tenanted by a single species. Changing the thing designated from the environment to the animals themselves, and reversing the sequence, we have the Niche-occupant (the species); the Association, of niche-occupying species living in one Habitat; the Subfauna, comprised of a number of Associations; the Fauna, of similar kind of grouping but of more inclusive rank; and the Life Zone, implying both area occupied and the various aggregations of animals living therein and characterizing a latitudinal-altitudinal belt.

The Santa Cruz Chestnut-backed Chickadee (*Penthestes rufescens barlowi*) according to our observations requires not only an environment of trees, but as a rule the presence of coniferous trees. Its niche must include the peripheral living foliage of these, producing inactive insects for forage purposes, and also dead trunks which provide enclosed nesting-sites of the proper dimensions. The local distribution of this kind of bird in Point Lobos Reserve thus is controlled by certain niche requirements peculiar to itself among all the birds there, within the general arboreal habitat.

Furthermore, the race *barlowi,* of this chickadee, quite sharply characterized by gray instead of rusty- or chestnut-colored sides, is restricted to the narrow humid coast belt (Santa Cruz Subfaunal Area) south from San Francisco interruptedly as far as Cambria, San Luis Obispo County, where, significantly, occurs the southernmost mainland stand of Monterey pines. Its near relative, *P. r. neglectus,* occupies the Marin Subfaunal Area, north of the Golden Gate, and there shows similar niche and habitat predilections as does *barlowi* south of the Golden Gate. Both are Transition-zone forms. Interiorly, the next-lying occupant of similar niche, habitat and life-zone, but in a more arid faunal environment, is the very distinct species, *Penthestes gambeli.* Not only is this latter, the Mountain Chickadee, the one at the latitude of Point Lobos on the slopes of the Sierra Nevada (race *P. g. abbreviatus* there, in Transition Zone and above, 4500 feet altitude up), but it is common on the near-by Santa Lucia Mountains, above the 5000-foot level where the yellow pine is the dominant conifer—the life zone hence Transition (race there *P. g. baileyæ*). Here, then, within the one coastal county of Monterey, we find evidence of distributional separation of two species of one genus on some subtle basis—possibly connected with differing degree of climatic humidity: Although only a few miles in air-line apart, *P. rufescens barlowi* keeps to the west base of the Santa Lucia range, within the belt of low sea-fogs, while *P. gambeli baileyæ* keeps to the drier upper slopes and summits of the same mountain range. We have no record of either kind of chickadee at this latitude from the distributional area of the other.

The Monterey Pigmy Nuthatch (*Sitta pygmæa pygmæa*) lives commonly in the same habitat, the coniferous forest, with the Santa Cruz Chestnut-sided Chickadee; and it does so, therefore, compatibly. Our observations show the niche occupied by the nuthatch to be essentially different. While

the two birds have about the same forage beat and cruising radius, often indeed seen closely associated, the nuthatch seeks (at least in the season of greatest food scarcity) static insect food in crevices of dry cones, twigs, and smaller branches in the sub-peripheral parts of the trees, and it uses its specialized digging tool (the bill) to dislodge or uncover these insects. In other words, the nuthatch has a food source beyond the usual reach of the chickadee. And then, too, with suitably rotted boles of trees available, it digs its own nesting cavity; it does not tolerate the chickadee.

This species of nuthatch (*pygmæa*) is endemic in the Transition life-zone of western North America, where it splits up geographically into several races. The subspecies *pygmæa* (named from Monterey) is restricted quite closely to the southern portion of the humid coast strip, from about Mendocino, Mendocino County, California, south (as with the chickadee with which it so often associates) to Cambria, San Luis Obispo County. Its relative nearest interiorly is the Black-eared Pigmy Nuthatch (*Sitta pygmæa melanotis*), resident in the yellow-pine belt along the west flank of the Sierra Nevada, at altitudes of 3500 to 6000 feet, according to slope exposure and other factors.

The Tawny Brown Creeper (*Certhia familiaris occidentalis*) is another coniferous-woods-inhabiting type. Its forage beat differs from that of both the chickadee and the nuthatch in that it covers the trunks and major branches of the trees, into the deeper crevices of which it is able to reach for insects with its extremely long, tweezer-like bill. In its nesting it can not dig cavities, but it must *find* such as are peculiarly suited to its instinctive nest-building needs. This niche factor may be the one which accounts for the small number of creepers in the Monterey pine woods elsewhere as well as within the Point Lobos Reserve.

The Brown Creeper is widely distributed in the Transition and Canadian life zones clear across the North American continent. It splits into a number of races, evidently on the basis, in part, of varying climatic humidity. The subspecies we call the Tawny Brown Creeper (*occidentalis*) is confined to the narrow humid Pacific Coast strip, south from the vicinity of Sitka, Alaska, to certain of the redwood-grown canyon bottoms on the coast of southern Monterey County, California. Next to the eastward, is found the Sierra Brown Creeper (*Certhia familiaris zelotes*), on the Sierra Nevada, 3000 to 7500 feet altitude.

The conspicuous Coast Steller Jay (*Cyanocitta stelleri carbonacea*) is another Boreal representative. The metropolis of the species *stelleri* (which belongs to western North America) is in the Canadian division of that zone, but races of the species occur more or less interruptedly far southward in zonal dilutions where very few other Boreal types are left. The race *carbonacea* thus occupies the Marin and Santa Cruz subfaunal divisions of the humid coast strip, while its counterpart along the Sierra Nevada is the Blue-fronted Steller Jay (*Cyanocitta stelleri frontalis*).

As regards habitat, the Steller Jay affects for the most part heavy evergreen woods, the limited extent of which on the Point Lobos Reserve probably accounts for its limited numbers or sporadic occurrence there. The sharply different habitat and niche (both) requirements of the two genera of jays, *Cyanocitta* and *Aphelocoma,* were clearly in evidence in the manner of their occurrence on the Reserve.

Of birds of Austral origin, the Migratory Allen Hummingbird (*Selasphorus alleni alleni*) is of peculiar interest in that, despite its great powers of flight individually and its seasonal migrations, it is restricted in its breeding to an astonishingly narrow range—to the fog-belt of California, from the Oregon line (scarcely beyond) south, regularly, to the vicinity of Morro, San Luis Obispo County. (There are occasional nesting records near the seacoast south to Ventura County.) We know of no authentic nesting record anywhere interiorly farther than twenty miles from the sea; and the species has no counterpart on the Sierra Nevada, though it *has,* in the Rufous Hummingbird (*Selasphorus rufus*), in the Northwest Coast belt to the northward of California. Curiously, a non-migratory race, *Selasphorus alleni sedentarius,* is found on the Santa Barbara archipelago, off the coast of southern California.

The life zone of *S. alleni alleni* is thus chiefly Transition; in the humid Pacific coastal division of this zone it is the dominant breeding hummingbird—the only one in most places, since the Upper Sonoran Anna Hummingbird enters the domain of the Allen only locally or sporadically at the south. There may be niche-factors operating for restriction, having to do with the presence or absence of certain flowering plants; but we have been unable to recognize any such factor.

Of the numerous Austral birds entering into the faunal picture at the Point Lobos Reserve, we select for special mention only the Road-runner (*Geococcyx californianus*). Here is a species, taking its entire geographic range into account, whose metropolis lies in the Lower Sonoran Life Zone; as a rule it invades Upper Sonoran only where this zone lies closely adjacent to the former. Its entry into Transition, as at Point Lobos, must thus be considered of an extreme marginal nature. We know of no such close approach to the sea north of Monterey County. The nearest existence of the Lower Sonoran Zone is in the Salinas Valley to the eastward and in the San Joaquin Valley still farther beyond.

Perhaps the *habitat* factors are of more importance in the existence of the road-runner, in this particular place, than the climatic factors of air humidity and summer temperature. We found those birds living on the Reserve to be closely restricted to the edges of tracts of chaparral—heavy chaparral on one side of a given "edge," grass-land on the other. The birds did most of their foraging on open ground within a distance of six yards of the shelter-affording brush; and their special food, large-sized insects, appeared to be available there in adequate amount, winter and summer

alike. The relative inability of the meager-winged road-runner, individually, to cover distance, indicates permanence of the population of the birds on the coast of Monterey County. This is not likely a sporadic or temporary case of ultra-marginal occurrence. The example is a most interesting one for further field study.

There is little question but that the climatic trends along the Pacific Coast strip of North America since late Pleistocene have been toward warmth and dryness. Granting some degree of sensitiveness of vertebrate animals to these factors, the tracts like Point Lobos within the southern Transition, notably those tracts which include the largest percentage of northwest coast Boreal species, may be looked upon as relict areas in the general retreat northward of the conditions in question. In other words, the species of the Boreal zonal category might be looked upon as stranded representatives from a time when Boreal and humid conditions were continuous and more emphasized here and farther to the southward along the coast below the latitude of Point Lobos. (*cf.* Chaney and Mason, 1933; Mason, 1934.)

Then, too, the north-south "spottiness" of the most Boreal conditions down the coast strip of California, their weakening toward the south, has doubtless helped to weaken the representation of Boreal species in them on the principle that "the smaller the disconnected area of a given zone (or distributional area of any other rank), the fewer the kinds of animals characteristic of that zone (or other areal unit) that can persist therein."

This picture, while in the main outline probably true, should not be too complacently accepted for mobile animals, particularly for birds. In birds, by reason of the ease of locomotion even in the most sedentary kinds, the pioneering process going on from season to season on the part of the young-of-the-year brings opportunity year by year for the restocking over and over again of marginal areas from more favorable reservoirs elsewhere, even from considerable distances. For some kinds, too, habitat restriction may be more important than zonal or faunal; that is to say, at least for the time being, conditions of subsistence (food, shelter, appropriate nursery sites) may be more effective in determining presence or absence than factors of climate. But even so, the trend in the same habitats, within the Santa Cruz Subfaunal Area, likely has been, down through Recent time, for the replacement of Boreal and Humid-coast niche-occupants by Austral and Californian niche-occupants.

In this process of competitive replacement, not only have the inherent structures and instincts of the animals figured in determining the course of events, but also the habitat conditions obtaining in adjacent territory interiorly. The effects of back-country conditions in hindering or even cutting off access of some kinds, and conversely in affording highways of repeated incursion of some other kinds, can hardly have failed to account in some measure for the make-up of the biota of the Point Lobos Reserve as we now find it.

ACCOUNTS OF SPECIES

TIME IN THE FIELD

Our field study at Point Lobos began in mid-November 1934 and extended for one year. During this period we made repeated short trips to the area, as indicated by the following tabulation. Numbers in parentheses are total days for the month. Part days are here counted as full days. In all, 124 days were spent on the Reserve.

	J. G.	J. M. L.		J. G.	J. M. L.
Nov.	18:29–30 (3)	25–27 (3)	June	28–30 (3)	19–24 (5)
Dec.	1:22–31 (9)	10–14 (5)	July	1 (1)	....
Jan.	2–5 (4)	....	Aug.	9–11 (2)	10–12 (2)
Feb.	21–24 (4)	19–25 (7)	Sept.	....	17–26 (10)
Mar.	28–31 (4)	19–25 (7)	Oct.	....	7–12:20–24 (11)
Apr.	....	9–18:22–30 (19)	Nov.	....	4–13 (10)
May	11–14 (4)	1–2 :11–21 (11)			

PLACE NAMES USED IN THIS REPORT
(See fig. 1, p. 34.)

Bassett Avenue	Little Mound Meadow
Big Dome	Mound Meadow
Bird Island	Point Cove
Blue Fish Cove	Point Lobos
Carmel Bay	Rat Hill
Carmel Cove	Sea Lion Point
China Cove	Seal Rocks
Cypress Point	Vierras Knoll
Gibson Creek	Warden's House
Little Dome	Whalers Knoll

When a species was encountered only once or a few times and in small numbers we have given the circumstances of each of those meetings, as being of greater value than more general statements based on so little experience with that species in this locality. Thus we have tried to make this report reveal what we actually saw rather than our opinions of what we might have seen had the opportunities been extended. At the same time, some incidents are given, not as examples of isolated events, but as representative of behavior which makes up the greater part of the lives of the animals. Although we may record here only one example of an activity, the trait represented probably recurs hundreds or thousands of times each year in the Reserve.

If L. M. Loomis (1895) had written down more fully the details of his observations made in 1892 and 1894, in this vicinity, we would be in much better position to judge the fluctuations in numbers and local distribution of the various kinds of birds than is possible upon comparison of our notes with his brief summaries. Our observations now recorded will, we are hopeful, in some measure serve usefully the faunal analyst who in future years undertakes more exhaustive work in this region.

We have treated the topics considered in detail, in the belief that any phase of natural history worthy of serious study requires detailed evidence and that this evidence should be a part of the printed report as material for subsequent verification and comparison. We point out, though, that not all details have equal significance. We have selected those which seem to us to promise important bearing on final clear understanding of broad questions in natural history.

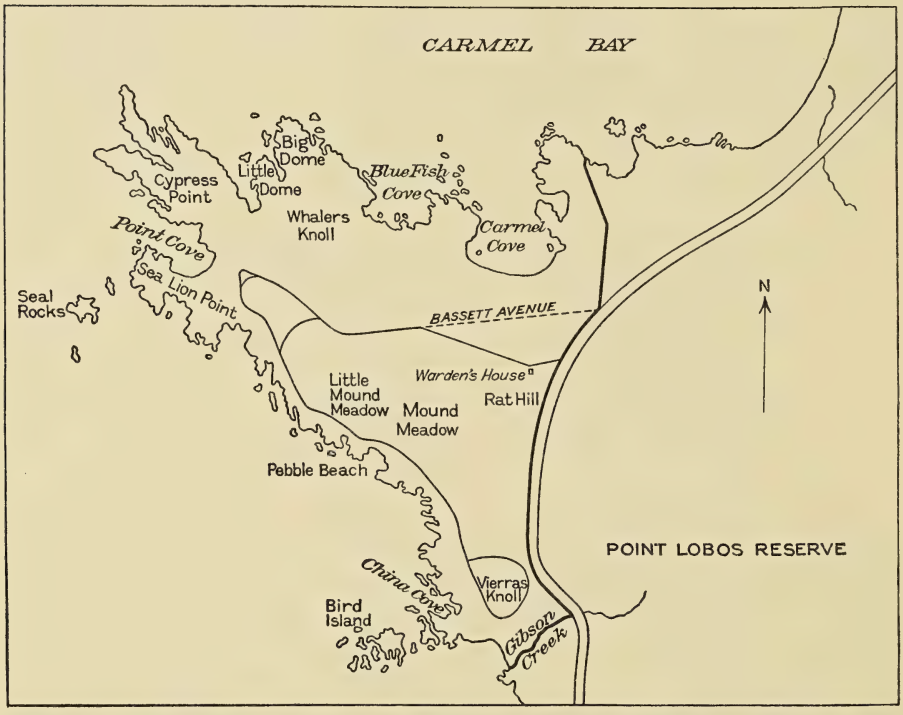

FIG. 1—Outline map of Point Lobos Reserve, showing boundaries, names of places mentioned in this report, and main road within Reserve in 1934-35.

In the matter of nomenclature, since we did no collecting of specimens whatsoever and thus have no secure ground for any systematic analysis, we use the binomial form of scientific name in the headings of our accounts of the species. In occasional notes, subspecific identity of the form or forms present is indicated. In our accounts of the nesting habits of birds, restriction to only certain kinds of information will be observed. Again, this was due to our intentional forbearance from disturbing the contents of any nest found within the area.

AMPHIBIANS AND REPTILES

Amphibians and Reptiles Found in Point Lobos Reserve, 1934-35

Slender Salamander—Batrachoseps attenuatus (Eschscholtz)
Oregon Salamander—Ensatina eschscholtzii Gray
Arboreal Salamander—Aneides lugubris (Hallowell)
California Toad—Bufo boreas Baird and Girard
Pacific Tree-toad—Hyla regilla Baird and Girard
Fence Lizard—Sceloporus occidentalis Baird and Girard
Alligator Lizard—Gerrhonotus multi-carinatus Blainville
Western Skink—Eumeces skiltonianus (Baird and Girard)
Gopher Snake—Pituophis catenifer (Blainville)
Garter Snake—Thamnophis ordinoides (Baird and Girard)

Slender Salamander

Batrachoseps attenuatus (Eschscholtz)

Slender salamanders occurred in small numbers throughout the pine woods and on certain portions of the grassland; twenty-nine individuals were noted definitely. Doubtless because of the influence of the sea in keeping this area moist, the season of activity of this animal at the surface of the ground was a long one. To illustrate this and the nature of the hiding places where the salamanders were found the records for this species are here given in detail.

December: 13th, during a rain at 4 p. m. one was uncovered in pine needles on the north side near the top of Rat Hill.

February: On different days, one beneath long split pole on moist ground by woodpile surrounded by pines; two under separate boards along gully close to Carmel Cove, and three days later two under one of these boards; two beneath one log and one beneath each of two others on floor of pine woods at west base of Rat Hill; two large individuals beneath a stick three feet long and eight inches in diameter on floor of pine woods and at base of tree where ground was thickly covered with pine needles and green grass; one beneath pile of small logs in edge of pine woods east of Mound Meadow; two coiled beneath a single piece of bark on moist floor of pine woods.

May: 12th, one under a short pine log east of Mound Meadow; 15th, three beneath a log near woodpile at west base of Rat Hill; 20th, one in rock wall in garden close to Warden's House, at 8:30 p. m.

September: 21st, one beneath short rotten log in pine woods; 22d, small young one beneath section of log in pine woods where ground was fairly dry; 24th, three small young under one small section of sawed log in pine woods; 25th, four under short pine log near north margin of woods, two large ones and two about half grown.

Oregon Salamander

Ensatina eschscholtzii Gray

A small individual of this salamander was found, on February 20, along with two slender salamanders beneath a pine log near the woodpile at the west base of Rat Hill. It was between 30 and 40 mm. long.

Arboreal Salamander

Aneides lugubris (Hallowell)

The arboreal salamander was recorded three times. On December 13, one was found beneath the margin of a log in the pine woods at the west base of Rat Hill. One was found beneath a three-inch plank at the top

of the shore on the east side of Carmel Cove on February 19. The next day one was seen beneath a short log two feet long and a foot in diameter in the pines east of Mound Meadow. When disturbed it moved into a small tunnel beneath the pine needles.

California Toad

Bufo boreas Baird and Girard

Common toads were reported as occurring through the spring and early summer in the vicinity of the Warden's House and Whaler's House. One from the latter place was examined on June 24. In the roadway near the Warden's House just after dark on June 28, a middle-sized toad "froze" in the wheel track as an automobile approached with the lights full on it. When a person approached it on foot, the animal moved to a hole among some rocks at the roadside as if over a well-known route. Not far from here, on September 19, another individual was seen in the roadway, but this one had been run over and smashed when it had failed to move out of the way of an automobile on the previous night.

Pacific Tree-toad

Hyla regilla Baird and Girard

This tree-toad apparently was the most numerous species of amphibian at Point Lobos. Adults were noted at many places on the area, but mostly where there was an extra supply of moisture. Early in the afternoon of December 11, an adult was found in a meadow-mouse runway in tall grass on a north-facing slope north of the Warden's House. Repeatedly in late February, tree-toads were found beneath boards and out among the grass on wet ground around the head of a small gully on the south side of Carmel Cove. An adult was seen on wet ground near the Warden's House on April 9 and another on May 20; on the afternoon of September 18, one was seen on wet ground just outside the north boundary of the Reserve. Others were heard among the pines on wet days.

Tadpoles were found at three places in the Reserve. Some in a small pool close to the bluff by Carmel Cove on February 21 were probably washed out by subsequent rains. Another temporary pool in the meadow west of Whalers Knoll on May 20 contained several hundred tadpoles with hind legs and nearly ready to transform. The water was drying rapidly and it may not have lasted until the animals left. The third breeding site was in a wooden trough south of Whalers Knoll where the water supply was permanent. Hylas were heard in this vicinity on January 5, and large tadpoles were noted feeding at the surface of the water on April 24. Tadpoles were recorded here on May 13, and on through the summer until August 10, September 20, October 11, and November 10. On the last date three recently transformed small adults were seen beneath a nearby board. Another in this stage was seen here on November 5, and two on November 10. Evidently the cold water in the trough resulted in a lengthened larval period, but the animals were finally able to transform. This seemed to be the only place in the Reserve where the complete life cycle could run in this species.

Fence Lizard

Sceloporus occidentalis Baird and Girard

The fence lizard proved to be the commonest species of reptile in the Reserve, but it was not sufficiently numerous to be met with every day. The animals lived in a variety of situation, from near the edge of the water on

the beach back through the pine timber. Favorite places where individuals sunned themselves were on the cliffs of sandstone and boulders of granite, and on cypress and pine logs. Several on April 10 were seen on logs and the lower portions of pine trees. One was as high as ten feet from the ground on a barkless, nearly vertical trunk.

In winter, on November 27 and February 19, two fence lizards were seen beneath the same board out in grassland on an east-facing slope near Carmel Cove. The earliest one active in spring was seen on the latter date clinging in mid-afternoon to a boulder.

Several young lizards under two inches in length were seen on the ground on September 23. On the same date all the adults noted were on rocks. Possibly it has to be learned by each generation that in this locality the rocks and logs are desirable living sites.

The presence of several road-runners in the Reserve may have been a considerable factor in keeping the numbers of this species low. One or more of these birds hunted continually in good lizard habitats, and once, on May 1, an actual capture was witnessed.

Alligator Lizard

Gerrhonotus multi-carinatus Blainville

Alligator lizards were found only eleven times, each time in some part of the open grassland. On November 27, and again on December 10, one was found beneath a board on an east-facing slope near Carmel Cove. Two young individuals were found, on February 20, beneath a short section of rotten pine log at the southeast edge of Mound Meadow. At 6 p. m. on April 15, an adult was seen by a path across the wet, grassy ground just west of the Warden's House. The animal was out on top of the grass and appeared rigid and cold. It retained its pose while being picked up and examined. After being placed on the ground the lizard made a movement after the observer had moved quickly, but it soon became quiet again and remained so as long as it was watched.

Another young one was found on April 23, beneath a slab of wood on grassland. One was seen on a rock wall close to the Warden's House on April 28. During the morning of September 18, a freshly molted alligator lizard entered a live trap set in a meadow-mouse runway in dead grass about knee high in the vicinity of Bassett Avenue. Another was seen active in a patch of dead grass on October 8. In the afternoons of October 20 and November 4, single alligator lizards were seen in roadways close to sage-brush. Each moved beneath the bushes when disturbed.

On October 21, a dead alligator lizard was found where it had been run over by an automobile in the road west of the Warden's House.

Western Skink

Eumeces skiltonianus (Baird and Girard)

A young skink with bright blue tail was seen in the early afternoon of May 15, a sunshiny day, on the pine-needle litter on the floor of the pine woods on the south slope of Rat Hill. Another was seen in the same location on August 11. In mid-morning on September 19, an adult with indistinct stripes and a reddish tail was found beneath a board on the floor of the pines near the southern margin of the woods. In the vicinity there was much brush and grass and many young trees.

Gopher Snake

Pituophis catenifer (Blainville)

Gopher snakes were recorded five times during our study of the Reserve. On March 29, one was discovered motionless in short grass in a trail near Mound Meadow; its head was peering out from a narrow loop of body. The snake measured 1120 mm. in length and 90 mm. in greatest girth. At noon on April 24, another, a little over three feet in length, was seen stretched out across the path inside the fence at the base of the Point.

On April 27, a gopher snake was found at a nest of white-crowned sparrows on the shore north of Carmel Cove. Only two young birds were left when the nest was found and the snake was touching one of these; probably it had already eaten one or two. The snake appeared unafraid of a person and it probably returned later. In this same vicinity on the afternoon of May 13, a snake, 38 3/4 inches long, was seen in the grass between two granite boulders. It was quite lively in the dim sunlight, despite a brisk, cool breeze. A small individual, only 380 mm. long, was seen on June 30.

Garter Snake

Thamnophis ordinoides (Baird and Girard)

On March 20 a garter snake about two feet long was seen in a grassy place near the southern edge of the pine woods. Another, on May 20, was beneath a ceanothus bush southeast of Whalers Knoll. On September 21 and 24, garter snakes were seen on dead-grass covered slopes northwest of the Warden's House and west of Whalers Knoll.

BIRDS

Birds Found in Point Lobos Reserve, 1934-35

Common Loon—Gavia immer (Brünnich)
Pacific Loon—Gavia arctica (Linnæus)
Red-throated Loon—Gavia stellata (Pontoppidan)
Holbœll Grebe—Colymbus grisegena Boddaert
Horned Grebe—Colymbus auritus Linnæus
Eared Grebe—Colymbus nigricollis (Brehm)
Western Grebe—Æchmophorus occidentalis (Lawrence)
Sooty Shearwater—Puffinus griseus (Gmelin)
Black-vented Shearwater—Puffinus opisthomelas Coues
Brown Pelican—Pelecanus occidentalis Linnæus
Farallon Cormorant—Phalacrocorax auritus (Lesson)
Brandt Cormorant—Phalacrocorax penicillatus (Brandt)
Pelagic Cormorant—Phalacrocorax pelagicus Pallas
Great Blue Heron—Ardea herodias Linnæus
American Egret—Casmerodius albus (Linnæus)
Canada Goose—Branta canadensis (Linnæus)
Black Brant—Branta nigricans (Lawrence)
American Golden-eye—Glaucionetta clangula (Linnæus)
White-winged Scoter—Melanitta deglandi (Bonaparte)
Surf Scoter—Melanitta perspicillata (Linnæus)
Ruddy Duck—Erismatura jamaicensis (Gmelin)
Red-breasted Merganser—Mergus serrator Linnæus
Turkey Vulture—Cathartes aura (Linnæus)
Sharp-shinned Hawk—Accipiter velox (Wilson)

Cooper Hawk—Accipiter cooperii (Bonaparte)
Red-tailed Hawk—Buteo borealis (Gmelin)
Golden Eagle—Aquila chrysaëtos (Linnæus)
Marsh Hawk—Circus hudsonius (Linnæus)
Duck Hawk—Falco peregrinus Tunstall
Pigeon Hawk—Falco columbarius Linnæus
Sparrow Hawk—Falco sparverius Linnæus
California Quail—Lophortyx californica (Shaw)
Black Oyster-catcher—Hæmatopus bachmani Audubon
Killdeer—Oxyechus vociferus (Linnæus)
Ruddy Turnstone—Arenaria interpres (Linnæus)
Black Turnstone—Arenaria melanocephala (Vigors)
Wilson Snipe—Capella delicata (Ord)
Hudsonian Curlew—Phæopus hudsonicus (Latham)
Spotted Sandpiper—Actitis macularia (Linnæus)
Wandering Tattler—Heteroscelus incanus (Gmelin)
Western Sandpiper—Ereunetes mauri Cabanis
Red Phalarope—Phalaropus fulicarius (Linnæus)
Northern Phalarope—Lobipes lobatus (Linnæus)
Glaucous-winged Gull—Larus glaucescens Naumann
Western Gull—Larus occidentalis Audubon
Herring Gull—Larus argentatus Pontoppidan
California Gull—Larus californicus Lawrence
Ring-billed Gull—Larus delawarensis Ord
Bonaparte Gull—Larus philadelphia (Ord)
Heermann Gull—Larus heermanni Cassin
Royal Tern—Thalasseus maximus (Boddaert)
California Murre—Uria aalge (Pontoppidan)
Pigeon Guillemot—Cepphus columba Pallas
Ancient Murrelet—Synthliboramphus antiquus (Gmelin)
Band-tailed Pigeon—Columba fasciata Say
Mourning Dove—Zenaidura macroura (Linnæus)
Road-runner—Geococcyx californianus (Lesson)
Barn Owl—Tyto alba (Scopoli)
Screech Owl—Otus asio (Linnæus)
Great Horned Owl—Bubo virginianus (Gmelin)
Burrowing Owl—Speotyto cunicularia (Molina)
Black Swift—Nephœcetes niger (Gmelin)
White-throated Swift—Aëronautes saxatalis (Woodhouse)
Anna Hummingbird—Calypte anna (Lesson)
Rufous Hummingbird—Selasphorus rufus (Gmelin)
Allen Hummingbird—Selasphorus alleni Henshaw
Belted Kingfisher—Megaceryle alcyon (Linnæus)
Yellow-shafted Flicker—Colaptes auratus (Linnæus)
Red-shafted Flicker—Colaptes cafer (Gmelin)
Acorn-storing Woodpecker—Balanosphyra formicivora (Swainson)
Lewis Woodpecker—Asyndesmus lewis Gray
Red-breasted Sapsucker—Sphyrapicus varius (Linnæus)
Hairy Woodpecker—Dryobates villosus (Linnæus)
Downy Woodpecker—Dryobates pubescens (Linnæus)
Nuttall Woodpecker—Dryobates nuttallii (Gambel)
Arkansas Kingbird—Tyrannus verticalis Say
Cassin Kingbird—Tyrannus vociferans Swainson

Ash-throated Flycatcher—Myiarchus cinerascens (Lawrence)
Black Phoebe—Sayornis nigricans (Swainson)
Say Phoebe—Sayornis saya (Bonaparte)
Traill Flycatcher—Empidonax traillii (Audubon)
Wright Flycatcher—Empidonax wrightii Baird
Western Flycatcher—Empidonax difficilis Baird
Wood Pewee—Myiochanes virens (Linnæus)
Olive-sided Flycatcher—Nuttallornis mesoleucus (Lichtenstein)
Horned Lark—Otocoris alpestris (Linnæus)
Violet-green Swallow—Tachycineta thalassina (Swainson)
Tree Swallow—Iridoprocne bicolor (Vieillot)
Rough-winged Swallow—Stelgidopteryx ruficollis (Vieillot)
Barn Swallow—Hirundo erythrogaster Boddaert
Cliff Swallow—Petrochelidon albifrons (Rafinesque)
Purple Martin—Progne subis (Linnæus)
Steller Jay—Cyanocitta stelleri (Gmelin)
California Jay—Aphelocoma californica (Vigors)
Yellow-billed Magpie—Pica nuttallii (Audubon)
Crow—Corvus brachyrhynchos Brehm
Clark Nutcracker—Nucifraga columbiana (Wilson)
Chestnut-backed Chickadee—Penthestes rufescens (Townsend)
Bush-tit—Psaltriparus minimus (Townsend)
White-breasted Nuthatch—Sitta carolinensis Latham
Red-breasted Nuthatch—Sitta canadensis Linnæus
Pigmy Nuthatch—Sitta pygmæa Vigors
Brown Creeper—Certhia familiaris Linnæus
Wren-tit—Chamæa fasciata (Gambel)
House Wren—Troglodytes aëdon Vieillot
Winter Wren—Nannus hiemalis (Vieillot)
Bewick Wren—Thryomanes bewickii (Audubon)
Long-billed Marsh Wren—Telmatodytes palustris (Wilson)
Mockingbird—Mimus polyglottos (Linnæus)
California Thrasher—Toxostoma redivivum (Gambel)
Robin—Turdus migratorius Linnæus
Hermit Thrush—Hylocichla guttata (Pallas)
Russet-backed Thrush—Hylocichla ustulata (Nuttall)
Western Bluebird—Sialia mexicana Swainson
Blue-gray Gnatcatcher—Polioptila cærulea (Linnæus)
Ruby-crowned Kinglet—Corthylio calendula (Linnæus)
Pipit—Anthus spinoletta (Linnæus)
Loggerhead Shrike—Lanius ludovicianus Linnæus
Hutton Vireo—Vireo huttoni Cassin
Orange-crowned Warbler—Vermivora celata (Say)
Yellow Warbler—Dendroica æstiva (Gmelin)
Audubon Warbler—Dendroica auduboni (Townsend)
Black-throated Gray Warbler—Dendroica nigrescens (Townsend)
Townsend Warbler—Dendroica townsendi (Townsend)
Hermit Warbler—Dendroica occidentalis (Townsend)
Tolmie Warbler—Oporornis tolmiei (Townsend)
Yellow-throat—Geothlypis trichas (Linnæus)
Pileolated Warbler—Wilsonia pusilla (Wilson)
English Sparrow—Passer domesticus (Linnæus)
Western Meadowlark—Sturnella neglecta Audubon

Red-winged Blackbird—Agelaius phœniceus (Linnæus)
Bullock Oriole—Icterus bullockii (Swainson)
Brewer Blackbird—Euphagus cyanocephalus (Wagler)
Lazuli Bunting—Passerina amœna (Say)
Purple Finch—Carpodacus purpureus (Gmelin)
Linnet—Carpodacus mexicanus (Müller)
Pine Siskin—Spinus pinus (Wilson)
Green-backed Goldfinch—Spinus psaltria (Say)
Spotted Towhee—Pipilo maculatus Swainson
Savannah Sparrow—Passerculus sandwichensis (Gmelin)
Oregon Junco—Junco oreganus (Townsend)
Chipping Sparrow—Spizella passerina (Bechstein)
White-crowned Sparrow—Zonotrichia leucophrys (Forster)
Golden-crowned Sparrow—Zonotrichia coronata (Pallas)
Fox Sparrow—Passerella iliaca (Merrem)
Lincoln Sparrow—Passerella lincolnii (Audubon)
Song Sparrow—Passerella melodia (Wilson)

Common Loon

Gavia immer (Brünnich)

On April 23 and 24 and on May 20, single loons were seen in flight offshore at the tip of Cypress Point. They were close to the water, apparently on their northward migration. The last date is a notably late one for a loon in this region.

Pacific Loon

Gavia arctica (Linnæus)

The Pacific loon was seen at Point Lobos in larger numbers than either of the other two kinds of loon. One was noted flying north off the point on November 18. On November 27, four individuals were seen. One was flying along the north shore, at 8 a.m.; one was flying south over the Seal Rocks, at 9:45 a.m.; one was swimming and another was in flight at Carmel Cove. Two days later another (or the same) was swimming and diving in Carmel Cove. A single loon was watched on January 3, in China Cove.

On the morning of May 17, forty or more (17 in one group) Pacific loons on their northward migration were seen in flight close to the water just off the tip of Cypress Point. On May 20, between 8:30 and 9:30 a.m., about 250 were seen flying north around the end of the Point. They were in about twenty groups. Fifty-eight were counted in one flock; five and seven in two others. On May 21, three more were noted in northward flight at the same place. Two flocks, one of eleven and one of eight birds, flew northward past the Point on the morning of June 20. A lone individual was seen on June 23, at the same place.

A flock of 150 or more loons noted at 10 a.m. on October 20, flying high over the water in migration toward the south, and one or two others singly (one flying over land), may have belonged to this species.

Red-throated Loon

Gavia stellata (Pontoppidan)

At 4:25 p.m. on November 29, a red-throated loon cried out from the water of Carmel Cove. It was discovered fifteen yards offshore, where it was preen-

ing at great length. Now and then it gave its cry—one, two or three times in close sequence—each cry beginning at a low pitch with almost guttural quality and rising to a high-pitched shriek. It could be seen that the mandibles separated, at least during the latter part of this utterance. Another was seen at this place on January 3.

On May 20, fifty red-throated loons in one flock and six in another were noted flying past Cypress Point between 8:30 and 9:30 a.m. A single individual was swimming in Carmel Cove on the morning of June 22.

Holbœll Grebe

Colymbus grisegena Boddaert

In the evening of December 11, a Holbœll grebe was swimming close to shore by the point just west of Blue Fish Cove. On Carmel Cove this grebe was noted singly or in two's on December 23, 26, and 31, February 21, and March 21 and 24. One was seen in the afternoon of April 12 in Blue Fish Cove.

Horned Grebe

Colymbus auritus Linnæus

Horned grebes numbering from one to four were present rather constantly through the winter. Most of the records were for Carmel Cove; the following dates were represented: November 29; December 11, 23, and 31; January 3; February 19 and 22; April 12. On December 26 one was seen on Blue Fish Cove, and on January 2, four were watched at China Beach.

Eared Grebe

Colymbus nigricollis (Brehm)

The eared grebe was represented through the winter by larger numbers along the shore of Point Lobos than any other member of its family. Groups of individuals numbering up to five were noted at Carmel Cove on thirteen days between November 27 and March 29. Again on May 12 and 13, three pairs in full breeding plumage were present on this cove. Another small wintering group was seen regularly through the winter in the protected cove off Gibson Beach. Counts made here on different days indicate a gradual decrease in numbers of the band through the winter, as follows. November 30, 27 individuals in 3 separate flotillas; December 24, 21; December 25, 13; January 4, 5; February 21, 3; March 28, 4. In a little cove near China Cove, two grebes were seen on January 2.

The first arrival in the fall was detected on October 22, when a single bird was seen close to shore off Gibson Beach. Two were present in Carmel Cove on November 4 and 5. Eleven were counted in this cove on November 10 and two more in China Cove.

Western Grebe

Æchmophorus occidentalis (Lawrence)

A single western grebe was noted in the afternoon of November 26, on Carmel Cove, and about the middle of the following morning one was seen asleep in the same vicinity. On November 29, on the same cove four were watched, at first well separated and close to shore, but later far out and near together, swimming and diving in usual fashion.

Sooty Shearwater

Puffinus griseus (Gmelin)

Large numbers of sooty shearwater were present on October 22 and 23, on the ocean beyond the tip of Cypress Point. They were seen both in flight and on the water, well offshore.

Black-vented Shearwater

Puffinus opisthomelas Coues

An assemblage of shearwaters watched off Cypress Point on October 22, appeared to belong to this species. The birds were in the near vicinity of a group of sooty shearwaters.

Brown Pelican

Pelecanus occidentalis Linnæus

Brown pelicans were present offshore at Point Lobos throughout the period of our work there. During this time their activity was centered about the largest of the islands close to shore near the southern boundary of the Reserve. Numbers of this species present and, to some extent, fluctuations of them are indicated by the following series of counts at Bird Island. Counts were made from various stations on the mainland. (See pl. 23 fig. A.)

Time	No. of Pelicans	Time	No. of Pelicans
Nov. 18 (11 a.m.)	28	Mar. 28 (8 a.m.)	92
Nov. 26 (8 a.m.)	50±	Apr. 10	200±
Nov. 30 (3 p.m.)	34	Apr. 28	200±
Jan. 2	103	May 11 (10:30 a.m.)	178
Jan. 3	293+	May 14 (11:30 a.m.)	233
Jan. 4	350+	June 28 (9 a.m.)	450±
Feb. 20	10+	Aug. 10	100—
Mar. 25 (a.m.)	50+		

With remarkably few exceptions, every pelican seen perched in the vicinity of Point Lobos was on the island mentioned above. On rare occasions (more frequent toward the end of the year) a small group perched on one of the smaller adjacent islands and on other islands along the shore. The birds, however, made trips away from this main home island to feed and to bathe. Groups seen on the way to and from the island numbered up to one hundred individuals, but usually fewer than a dozen were seen together. Sometimes they fished in the narrow channel between the Seal Rocks and the mainland and in the general vicinity of the tip of Cypress Point. However, the greatest number appeared to fly off to some more distant place to the northward. The birds, both leaving and returning, usually flew close to the water, sometimes seeming almost to touch the waves.

When food was sighted, the procedure noted most often was for the bird to turn back and drop to the surface of the water. Then it made quick jabs with its opened bill—sometimes only a few and sometimes many. Often the flight was resumed quickly. No bird was seen to dive completely beneath the surface, except on one day, October 12. On the morning of that day several hundred were feeding near the tip of Cypress Point. Nearly all were diving from a height of ten to twenty feet above the water. Each bird splashed and went almost, or completely, under the water, but immediately came up. Apparently they were catching a different kind of fish from the

usual. This behavior was not repeated during our observations in the vicinity.

Bathing was noted on March 25 when about twenty individuals were out in the water to the south of the island, all flapping their wings and splashing on the surface. Again on June 21, several were bathing along the shore of Bird Island.

A striking feature of brown pelican behavior noticed at Point Lobos was the strongly marked trait of keeping over the ocean in flight and avoiding the mainland. At no time before the middle of the summer was a pelican seen in flight over any part of the mainland. The significance of this habit is not clear. It may be more economical to fly always over prospective fishing areas, or it may be that pelicans feel a greater degree of safety when they are on or over the water.

On June 29, pelicans were first noticed flying over the tree-tops, going due north, pursuing about the same route across the peninsula as the gulls did the previous winter. Indeed the pelicans were then conspicuous features of the coastal landscape—flying high in squads over land as well as sea. In the early part of the afternoon next day, record was kept of the flocks of pelicans noticed in overhead flight. Out of 156 birds checked, 66 were going north and 90 were going south. In the 22 high-flying squads the average number of birds was 7. In addition there were the usual squads of pelicans out low over the sea. In two of the flocks recorded, brown-bodied, white-faced adults were leading; in two instances white-bellied immatures. At least one squad, of nine, consisted altogether of immatures. These nearly all showed molting of flight feathers in progress.

Another type of response to the physical environment, noted many times, was the tendency of the birds when on the island to congregate on the leeward slope where they were not exposed to the wind. This meant that during the winter the birds were seen most often on the landward side. When perched, they were usually close together, all headed into the wind with heads down and drawn in.

The breeding cycle of the pelicans could not be followed precisely without actual visits to the island; but incidental observations were made from stations on the mainland. Early in the winter the birds appeared most often to perch on the sharp, bare rocky ridges toward the south end of the main island or on one of the smaller rocky islands to the west. On January 4, a great mass of pelicans was closely packed on the landward, northeast top bench of Bird Island. A small group watched on February 20 tended to be arranged by two's.

On March 25 and 28 many of the pelicans were standing where there were bushes on the southern, sun-facing, upper part of the main island. Many were scattered, spaced a bill-thrust apart; some acted as if sitting on nest sites, squatting low with bills drawn in, others reached out for sticks close to these sites. Immature plumaged as well as adult birds were represented. Some of the latter showed conspicuously maroon-red colored patches on the basal portions of the gular pouches. This red patch seemed at times to be flared out in demonstration toward a near neighbor.

Nearly two hundred pelicans on the large island on April 10 were divided into two groups, a smaller group at the northernmost of three small peaks and the larger toward the south end. Several birds appeared to be on nests and most of them tended to be arranged in pairs. There was much moving and changing of position. Many times birds struck at their neighbors with their bills, but the blows, which appeared to be not very dangerous, were

avoided. Several "mounts" were noticed but it could not be determined if they were completed.

Again, on the morning of April 13, nesting activities were watched at this site at the north end of the island. Most of the group, about thirty birds, seemed to be paired and active in nest-building. The procedure was for one member of the pair to stay on the nest while the other went for material. The latter picked up sticks and weed stems in its bill and flew with them to the nest. Then, standing beside the nest, it opened its bill and shook out the sticks which were then taken and arranged by the sitting mate. The highest sites seemed to be most desired, for the birds were most crowded there and they were the most active in driving away intruders. Downslope were scattered the single birds and immature ones which appeared as yet to take no part in nesting.

By April 28, all the pelicans apparently had moved over with the nesting birds at the north end of the island, thus extending the nesting area far down the mainland side of the island.

On May 11, 30 or 40 of the 178 pelicans counted were obviously immature. They were grouped together on a level low bench, preening, sleeping, or jostling one another. The rest, adults, were widely scattered over the landward side of the island; some were standing or squatting on spots where no bit of nesting material was visible. About eight good-sized nests had birds crouched low on them. Some of the birds among the rocks toward the north end of the island were difficult to make out, they so closely resembled in tone of color and in shape the broken blocks of rock. There seemed to be no nests on the steep slope toward the south end of the island where there had been so much activity on March 28. The birds were not very active; one flew over carrying a long, green weed dangling from its bill, but dropped it in the water and did not retrieve it.

By June 20 the number of adult pelicans at this colony had increased to nearly four hundred. The birds were more active than they had been at any previous visit and nearly all seemed to be engaged in some phase of nesting. On the lower, flatter part of the island the birds were mostly carrying sticks or thrusting at one another with their bills. Several times one was seen running from a gull. Many attempts at copulation, none completed, were noticed. Usually the bird which mounted held the other with its bill clasped across the base of the neck. The bright areas noted earlier in the season at the bases of the gular patches had faded to a pale yellowish brown. Some bright color was detected toward the end of the lower mandible. In one of the upper nests was a single young bird about one-third grown, covered with white down and large enough no longer to need brooding by its parents. At least one other nest held recently hatched young.

More pelicans were in sight on, and flying around, Bird Island on the morning of June 28 than ever before. Approximately 450 were counted at that time. The majority were scattered about, simply roosting or loafing, on the smooth bench of the island top; many were on the steeper hillslopes, many on the cliffy sides down toward the water, and some at the water's edge. Only eight well-formed nests could be made out, all near the top of the northwesternmost hump of the island. The large young bird previously noted on one of these was standing, fanning the air with its unquilled wings. An old bird was feeding two smaller young in another nest and, on the remainder, old birds were sitting closely. Two adult-plumaged birds seen were each carrying a stick, but the sticks were taken to places on the bare rock surface on the lower part of the island where there was no trace of a

nest or even a likely site. Of the scattered pelicans, it was judged that half were immature, that is, yearlings.

Search was made with the aid of glasses, from the mainland, on this date and others for signs of ground-squirrels on the island, but without finding any. We had heard rumors, indirectly, from persons who had visited the island, that ground squirrels inhabited it and that they ate the eggs of seabirds nesting there.

It looked as though the obvious increase in numbers at the pelican colony was the result of summer influx of non-breeders from south along the Pacific coast—from the colonies on islands of Lower California and the mainland of Mexico. A small resident nucleus here (the birds actually breeding in this, the northernmost nesting station known for the species) might, in addition to the favorable roosting site, attract and hold the mobile population from the south.

On the morning of August 10, about twenty young pelicans were perched along the ridge at the north end of the largest island. Three or four others were still in nests on the lower, flat area. At this visit fewer than one hundred adults were seen about the islands or in flight.

Another influx of pelicans, but a much greater one than any earlier ones, came before our next visit to the Reserve, on September 18. Late on that morning at least a thousand pelicans were perched on Bird Island and the nearby rocks. After repeated counts of the birds on Bird Island, and watching of the numbers flying to and from there during the next week, it was concluded the last count (of 1000) included only about half the pelicans present. The estimated two thousand birds perched on all sides of all the rocks in the vicinity of Bird Island, as well as on the adjacent mainland shore; occasionally a few stopped at the Seal Rocks. Once at this late date, two birds were seen to pick up sticks which, however, they soon dropped.

At this time the pelicans commonly moved off to the north to feed, in groups of usually fewer than fifteen individuals which nearly always flew along the shore and so close to the water that they appeared almost to touch the surface and their shadows showed distinctly on the water. They avoided the land, except some that crossed over the very low portion of the tip of the point toward the Seal Rocks. Some of the flocks were accompanied close behind by a few gulls. Sometimes when a few lit in the water they acted as decoys, and pelicans and gulls flew to the spot from all directions until there was a large congregation on the surface with a few individuals coming and going. The flocks noted in flight on September 25 were larger than usual, numbering from fifty to one hundred birds each.

In October something caused a considerable number of the pelicans in this vicinity to die. First indications of a disorder were detected on October 23, when a pelican was found on the ground in Little Mound Meadow. It apparently had just been in the water as its plumage was wet, but it seemed to be weak and was unable to rise from the ground, although it did flap its wings and move off toward the ocean. During the first week of November scattered carcasses were noticed along the shore until, on the 9th, as many as ten were counted in a small section of the coast. If this number was a fair sample, there must have been no fewer than fifty dead pelicans along the shore of the Reserve at this time. No explanation for the deaths was apparent.

No fewer than three thousand pelicans were observed at Point Lobos on November 10. At 9:30 a.m. the whole landward side of Bird Island was covered with the birds, mostly spaced out rather evenly from three to six

feet apart. The main activity was preening and drying of plumage, but many individuals were resting quietly in a standing or squatting position. Several were seen picking up and then dropping sticks. Other islands, including the Seal Rocks, were also covered with pelicans. In addition, a great many were flying to and returning from fishing grounds.

The large size and peculiar structure of the brown pelican combined with its large numbers at Point Lobos make it one of the major attractions for visitors to the Reserve. The breeding colony here is the only one known along the Pacific Coast north of the Channel Islands. Its presence was made known by Laidlaw Williams in 1927, and a more extended account was published by him in 1931. We believe that many visitors will welcome an opportunity to watch these birds, at close range, from the mainland. The birds are likely to remain as a breeding colony as long as Bird Island is left undisturbed by man.

The pelicans deserve to be protected at Point Lobos. It seems desirable that no person, not even an officer on the Reserve, be permitted to go to the island where the pelicans nest and roost. This measure is especially important in the nesting season when disturbance may be fatal to the very small colony of birds that breed there. Under no circumstances should any building or other structure be placed on the islands or on the shore in the near vicinity of them. Another worthwhile precaution for the safety of the nesting colony is to avoid the concentration of groups of sightseers in the near vicinity of the islands; individual persons who watch the birds from the nearest point on the mainland can cause no serious injury.

Farallon Cormorant

Phalacrocorax auritus (Lesson)

On the morning of June 19, a single Farallon cormorant was seen swimming and diving close to the shore just south of the tip of Cypress Point.

Brandt Cormorant

Phalacrocorax penicillatus (Brandt)

Greater numbers of the Brandt cormorant nested at Point Lobos than any other ocean bird. The marked tendency of the birds to select perching and nesting sites on the outer, seaward sides of rocks and islands made it impossible to make accurate counts of all those present. Our notes indicate, however, that fewer individuals were present in the fall and early winter than during the breeding season. As a result of repeated counts and many estimates it was concluded that between 300 and 500 individuals were living within the limits of the Reserve in May.

Cormorants were nearly always to be found on Bird Island or the several smaller islands and rocks beyond it to the west. Another much-used perching location was the Seal Rocks. Smaller rocks along the north shore and in Carmel Cove were nearly always occupied by one or more individuals of this species. Cormorants in flight close above the water or diving for food could be seen from any point on the shore. On February 19 in the morning, many were feeding thus north of the tip of the Point.

It was not often that any other species paid attention to a cormorant. Occasionally when one came too near to a nesting pelican, the latter would lunge at the intruder, but no pursuit was seen. On May 14, a Brandt cormorant flying over a channel close to the mainland was "stooped" at by an adult

female duck hawk. The cormorant dodged heavily down toward the water and the falcon kept on its way. Apparently the move on the part of the hawk was merely some form of play. On November 29 a cormorant that was swimming and diving in Carmel Cove kept near a red-throated loon, as if seeking company.

The breeding season for this species had begun when a group of fifty or more was watched between 8 and 8:30 a.m. on February 20. The birds were perched along the crest of one of the rocks beyond Bird Island. Some were definitely associated in two's. Several were posturing, one with tail held vertically upward, bill and neck upward and wings open and waving. This was kept up for several seconds, but apparently no other birds paid any attention to it. By 8:45 all these birds were gone.

A great many cormorants were seen in this vicinity on March 25. During low tide many individuals were making trips off to the southeast where they dived for seaweed and carried big bunches of it back to the islands. Again on April 10 many were carrying material for nests on the outer side of the outermost of the islands. Thirty-five individuals were counted along the top and side of this rock at 9:30 a.m. on April 13. At least one bird was on a nest sufficiently distinct to be seen from shore. Other birds were scattered about over the rock; one was posturing. By April 28, nests on this island were conspicuous. Several individuals noted were pulling up the land plants along the eastern rim of the largest island and carrying them off for nesting purposes. This species thus does not depend entirely upon seaweed for nest-building materials.

On May 13 it was estimated that 300 or more cormorants could be seen on the landward side of two of the outer rocks beyond Bird Island. Most of the birds had nests, but some were still building. The ones on the seaward sides of the rocks could not be seen, but they doubtless outnumbered the ones in sight. (See pl. 23 fig. A.)

A Brandt cormorant was sitting on a solitary nest, May 12, on an outlying rock on the west side of the entrance to Carmel Cove. Six other cormorants, some showing white neck-plumes, were perched on the same rock. On June 22, half a dozen or more nests were seen on this rock, mostly on the exposed, north side.

Pelagic Cormorant

Phalacrocorax pelagicus Pallas

Of the two kinds of cormorants present commonly throughout the year at Point Lobos the pelagic is represented by smaller numbers. Also it is smaller in size, with thinner neck and head, slenderer build, and more rapid wing-beats in flight. Although it was not practicable to make accurate determinations of the total number present, it was finally concluded after many partial counts and estimates that approximately 200 were present on the shores of Point Lobos at the beginning of the nesting season. Thus the population was about equal to that of the much more conspicuous brown pelican and scarcely more than one-third as great (probably much less) as that of the Brandt cormorant. This bird was less strictly localized, even on so small a stretch of coast, than the two relatives just mentioned. Roosting and nesting places were scattered all along the shore of the point. At no place was a group seen which numbered more than 100 individuals.

One or more pelagic cormorants feeding or in flight could be seen nearly always by watching for a few minutes at most any place along the shore. A favorite feeding place for certain individuals was Carmel Cove. One that

was diving here on February 22 finally came up with a good-sized crab and flew off with it out into the bay.

On November 18, ten or more pelagic cormorants were perched scattered out on the face of a cliff directly above the surf on Bird Island. Also on the south end of this island, on January 4, 16 individuals were counted on the face of a cliff.

The largest roost of this species discovered on the area was on a high cliff facing the ocean on the south side of the Seal Rocks lookout. The birds congregated here regularly every afternoon to spend the night, and observations were made there frequently. On January 3, 56 birds were counted, spaced a few feet apart, perching on the nearly vertical face of this cliff. On January 5, at 4:30 p.m., 45 were counted; 20 minutes later the number had increased to 61. Four counts made in late afternoon on February 21 revealed 75, 77, 75, and 79 individuals on this cliff.

At 6 p.m. on March 21, about sixty cormorants were perched scattered over the face of this cliff and were settling themselves for the night. Some of them were in two's close together, but most of them were located singly, each out of the reach of any other individual. Several were seen pecking at others which lit too near, but in these instances the intruder flew off and circled back to some new location. Evidently the roosting places were determined at random; indeed, the arriving birds appeared not to know where they would alight and sometimes several approaches were made before a bird finally settled. At first the white feathers on the flank patches showed conspicuously, but when the birds had become settled they were folded out of sight. Then all of the birds were facing the cliff with their backs outward. Many had their bills tucked in among the feathers of the back, and in this position the tails were not used as props; they simply hung down free, save when raised in the act of defecation. Excrement was mostly ejected clear of the cliff face and the birds below. At sundown, the birds were still changing positions and arriving. The last count, made at 6:30, showed 68 on the cliff.

April 13 was a rainy day and heavily overcast. The cormorants arrived at their roosting place early that afternoon, and by 3:30 six had already settled there.

When the nesting season arrives the pelagic cormorants evidently break up into smaller groups than were observed at the roosts. On the cliff by Seal Rocks lookout three nests had been constructed and brooding birds were on them by May 11. On the nearby east-facing cliff of similar appearance one nest was occupied by that date. (See pl. 22 fig. A.)

Another aggregation of roosting pelagic cormorants was noted on the afternoon of December 11. Twenty or more birds were then perched on the steep landward side of the rocky island just west of Blue Fish Cove. This wall was whitened with excrement and was apparently a regularly used roosting place. Grunting sounds made by the birds could be heard easily on the mainland more than one hundred feet away. When the cries of a gull disturbed the birds, all but two of them flew off and into the channel.

At this island on April 29, at 5 p.m., two cormorants were standing together on a small accumulation of nesting material on the landward side. The nest had in it one stick at least 3/8 inch in diameter and about 20 inches long. Several times on that afternoon a cormorant came to the east end of that island and gathered a billful of pine needles and trash beneath the single pine tree there, and then would fly off to the outer side of the island. This was noticed again on May 13. On May 14, the single bird brooding

on the nest visible from the shore stood up and finally flew off when the observer came too near. The nest contained two white eggs. (See pl. 22 fig. B.)

Judging from the behavior of many pelagic cormorants seen in May in Blue Fish Cove, they were nesting in several locations on the bluff around that cove.

On May 21, nine nests were found on the northeast-facing slope of the large, steep rock just south of the tip of the main Cypress Point. These were composed largely of flowering plants that had been pulled up on land, including one branch with flowers still fresh. Each nest was covered by a brooding bird and there were two or three extra ones. When the birds shifted positions, the observer could see four eggs in each of two nests and two in two others. One bird flew in and took the position of one on a nest, which then flew off. Another arrived carrying a billful of grass and sticks which it dropped at the edge of a nest, and then flew away. The greeting by the bird on the nest in each of these instances consisted in opening the mouth widely and elevating the tail. All the incubating birds held their bills open and vibrated their throats rapidly in their breathing. They spent most of the time preening, rubbing the side of the head on the preen gland more often than they rubbed the bill. This group of nests occupied an area not over fifteen feet across.

By June 19, all these nests but one contained good-sized young. One nest still held eggs. At most of the nests a parent was brooding, at some the parent was standing beside the young birds, and at one the young birds were fed several times while for a few minutes the group was being watched.

Great Blue Heron

Ardea herodias Linnæus

A great blue heron was seen at 8 a. m. on February 19, 1935, flying toward the south high over the Reserve.

American Egret

Casmerodius albus (Linnæus)

On October 23, at about 11 a. m., a single egret flew westward along the southern shore of the Reserve to the vicinity of Little Mound Meadow. Then it circled upward and moved off toward the north.

Canada Goose

Branta canadensis (Linnæus)

In the afternoon of November 4, a lone goose of this species was seen on the water close to the shore in Carmel Cove. No other bird was near and it was difficult to judge the size of this one, but it seemed about right for the small race called cackling goose (*Branta canadensis minima*).

Black Brant

Branta nigricans (Lawrence)

On May 13, at 4:20 p. m., out beyond the farthest reef by the Seal Rocks, a line of birds thought to be black brant was seen. They had necks outstretched, colors dark, with wing profiles and rate of beat those of a goose. Sixty were counted as they passed due northward low over the water; at

one moment they formed a V, with one arm longer than the other, but they resolved back again into a line apparently oblique, in horizontal plane, to direction of travel.

American Golden-eye

Glaucionetta clangula (Linnæus)

A male and female American golden-eye were watched actively diving on February 22, close to the beach in Carmel Cove.

White-winged Scoter

Melanitta deglandi (Bonaparte)

On May 20 in mid-morning a flock of five female white-winged scoters flew past the tip of Cypress Point, evidently on northward migration flight. In the fall this species was first noted on October 24. Ten were flying westward along the south shore on the morning of November 8.

Surf Scoter

Melanitta perspicillata (Linnæus)

Surf scoters were noted on nearly every visit to Point Lobos between November 26 and March 29. They were encountered, usually singly, all along the shore, but more frequently in the small coves. The largest flock, of around one hundred birds, seen on November 26, was flying toward the north. About 9 a. m. on May 20, two groups flew north past the tip of Cypress Point. One was composed of two males and three females; the other of three males and three females. These birds were moving rapidly and close to the water. They were obviously not cripples, but merely late migrants. Another group of four birds flew northward past the Point on the morning of June 20.

The first ones seen in the fall were two, in the morning of October 23, in the water close to the south shore. One was swimming in Point Cove on November 4. A group of four was seen in the mornings of November 7 and 8 in Carmel Cove.

Ruddy Duck

Erismatura jamaicensis (Gmelin)

A lone (apparently injured) ruddy duck was watched, March 28, on China Cove. It was in company of a surf scoter. On the morning of April 28 the crippled bird was seen again, this time being carried by small boys who later liberated and watched it in a small tide pool.

Red-breasted Merganser

Mergus serrator Linnæus

Red-breasted mergansers were seen on twenty-two occasions from November 27 to May 20. On the latter date a single individual was flying northward past the tip of the point at 9:30 a. m.—apparently a late migrant. Usually only a single bird was seen. The largest number, six, was recorded on February 22. Carmel Cove appeared to be the favorite feeding ground for wintering individuals of this duck. This species was first seen the second fall on November 10, when a single one was swimming in China Cove.

Turkey Vulture

Cathartes aura (Linnæus)

Turkey vultures, one or two individuals each time, were seen in flight high over the Reserve on four days in spring—March 20 and 23, April 11, and May 1.

Sharp-shinned Hawk

Accipiter velox (Wilson)

Although individual sharp-shinned hawks were seen at Point Lobos on ten days from November 25 to April 28, we are not certain that this species was present on the area for any considerable part of that time. Each individual may have been there only temporarily while on a foraging trip. It is possible, however, that the Reserve supports a resident pair and that the infrequent observations are the result of the quiet manners on the part of the species. There are good prospects that if it is not already established, this species will become a permanent and rather significant part of the fauna of the Reserve. Encounters with this small hawk by even the casual observer are likely to be remembered. The responses to one of them on the part of smaller birds are as likely to attract attention as is the hawk itself. A series of examples of such experiences is given below.

At 3 p. m. on November 25, a sharp-shinned hawk flew to a perch in the pines. In response to squeaks it moved to a position nearer the observer. Each perch was a limb one-half to three-fourths the way up in a pine. After a few alarm notes all the numerous small birds in the vicinity became quiet. The flight over the pine woods on December 12 of another of these hawks resulted in all the small birds in the vicinity uttering alarm notes and seeking cover.

On December 24 one of us was at the edge of a brush patch "squeaking" when a female immature sharp-shinned hawk lit in a pine about forty feet away and mid-way up in the tree. It remained perched quietly for about six minutes. Later, one was seen in flight toward Gibson Creek where it made a swoop at some small birds in the brush, but without making a capture.

Twice during the winter we saw a sharp-shinned hawk make a dash from the tall pines north of the Warden's House out into the field of mustard and other low plants next to the north. The first time, in the early afternoon of January 3, one dashed down among the plants, only fifty feet from the observer, made an unerring capture of what appeared to be a white-crowned sparrow from on, or within a few inches of, the ground, and flew in labored manner with its prey in its talons, back into the woods. It went to a perch fully forty feet up in a pine. The small birds left near the point of capture were thereafter quiet and hard to flush. When the hawk made its dash there had been a frantic exodus from the vicinity, but many of the birds remained under cover. By count, fifty-six white-crowned sparrows were routed out of nearby brushy tangle, all loath to leave cover after the hawk episode. (See pl. 12 fig. B.)

Again, on February 22, about the same time of day and in almost the same place we suddenly became aware of three Brewer blackbirds and three western blue birds taking flight in startled manner from some bare ground, and then the hawk, an adult female, flew past on set wings from the direction of the woods. It checked its flight just above some mustard, hovered there irresolutely for a moment with long legs extended far down, and then

flew back to perch beneath the canopy at the margin of the tall pines. This time there had been no kill.

At 8 a. m on April 11, a sharp-shin flew out from the pines and pursued a small bird, but the result was not seen. On the 28th at 9:30 a. m., one lit high in a pine on the south side of Rat Hill, carrying a bird in its claws, which it proceeded to pick and eat.

On October 10, a sharp-shinned hawk was seen in flight. Next, on the morning of November 5, one was seen at the margin of the pines close to the Warden's House. The hawk flew at and attempted to catch a meadowlark, but the latter screeched loudly (evidently in terror) and escaped. The hawk flew to a perch in a pine and then moved off toward the west. A sparrow hawk in the vicinity flew out, showing some concern at the presence of the sharp-shin.

Cooper Hawk

Accipiter cooperii (Bonaparte)

Six times single Cooper hawks were noted. On November 26, at noon, one was flying in circles high over the open ground west of the pine woods. At 7:30 a.m. on February 21, one was seen perched in the top of a dead ceanothus bush on the south slope of Whalers Knoll. One was seen in flight over the cypresses on the morning of October 9. On the afternoon of October 20, one lit in a lupine bush close to a flock of quail, east of Vierras Knoll, and then flew on to the pine woods. The quail uttered alarm notes.

In the morning of November 6, a Cooper hawk was perched on an outcrop of conglomerate on the point toward Seal Rocks. It was disturbed by the repeated diving at it of a sparrow hawk. When it flew, the sparrow hawk pursued it out of sight toward the east. The next morning when one flew around the south base of Whalers Knoll toward the east, ground squirrels in the vicinity ran for cover, bush-tits in a flock uttered "confusion" notes, and a sparrow hawk started after it in pursuit, but soon lost interest and turned back.

Red-tailed Hawk

Buteo borealis (Gmelin)

The most conspicuous kind of hawk at Point Lobos was the red-tail. One or two individuals were seen almost every day. In frequency of observation this species ranked about equal to the sparrow hawk. Judging from the differing behavior and appearance (plumage) of the individuals watched, half a dozen or more red-tails must have visited the Reserve, but not all of them regularly or at the same time.

Red-tailed hawks were seen in all parts of the area. Perching birds used the tallest dead cypresses, as well as dead cypresses along the shore whence an open outlook was afforded. Dead trees, usually pines, on Big Dome, and on Whalers Knoll and at exposed places elsewhere, often on shore, were also favored as resting places or lookouts. These perching trees were not always dead ones; extra tall live pines were chosen sometimes. Altogether, possibly as many as twenty trees provided a sufficient degree of suitability, mainly because of the view of the surroundings afforded, to be occupied repeatedly by one or more of these hawks. It was obvious that the birds made selections, but all the reasons for these selections were not always readily apparent to the human observer.

Visits of this bird to the area seemed to be almost entirely the result of markedly favorable forage conditions. On February 21, from 7:30 to 9 a. m., one was perched in a dead cypress on the south shore close to the base of the Point. At first it was eating some small mammal held down by its feet. Several times it shifted its position from one perch to another in the same tree. At 8 a. m. on April 25, a hawk in the pines along the eastern edge of Mound Meadow flew down to the top of a bush and caught some animal which it carried away. Again in the early morning of May 15, one was seen carrying some small mammal high over the pine woods toward the east and across the highway.

Many times birds were watched that appeared to be hunting. They seem to spend a large share of their time looking for prey, and possibly pass up many opportunities, waiting for more certain capture. Some such explanation seems necessary for such instances as the following.

One red-tail, that was soaring rather close to the ground east of Vierras Knoll in mid-morning on March 23, moved directly over a ground squirrel that was clinging in an exposed position in the top of a leafless lupine bush. The squirrel kept its position and the hawk moved on past without molesting it. It is possible that the hawk did not even see the squirrel, or that it was not looking for food at that particular moment.

On December 24, in the afternoon, an immature red-tailed hawk left its perch on a lone pine west of Vierras Knoll and proceeded to circle and fly back and forth low over the open ground, as far north as Mound Meadow. It flew close to two observers with great indifference to them, intent on the ground where there was plenty of sign of gopher and, in thicker grass, of meadow mouse.

A common habit of red-tailed hawks noticed many times on this area was that of poising on nearly motionless wings and facing directly into the wind. This was recorded most often over the edge of the flat top of Whalers Knoll. The high type of soaring flight in which the bird moves in wide circles was seen most often over the pine woods.

Evidence of animosity of other birds toward red-tailed hawks was noted only a few times. One circling over the pine woods on February 22 was being persistently harried by a lone sparrow hawk. Again, on March 24, in the evening, one was pursued by a sparrow hawk for more than a quarter of a mile. Other examples of this enmity were noted on April 9 and November 9. In the morning of December 11, a red-tail flew toward the north boundary fence. Several crows flew out to meet it and "mobbed" it—on the ground, in the air, and on a fence post where it lit momentarily. A red-tail which flew over the nesting colony of Brewer blackbirds north of China Cove was mobbed by the blackbirds.

Several times we thought that red-tailed hawks were nesting or were going to nest in the pine woods south of Rat Hill, but no definite evidence of such nesting could be found. On March 24, two hawks were screaming in flight over the woods in this vicinity. Later, on May 11, similar behavior was noted farther south in the woods; but no nest could be found that certainly belonged to the birds, and not to gray squirrels.

For several hours early in the morning of June 20, the calls of a young red-tail recently out of the nest were heard in the vicinity of Rat Hill. About 9 a. m. this bird and an adult were seen there in flight and perched in the pines, the former continuously uttering the coaxing cries.

Golden Eagle

Aquila chrysaëtos (Linnæus)

One, two, or three golden eagles occasionally visited Point Lobos from somewhere off to the east. For fully ten minutes, on December 22, two were watched in flight high above Whalers Knoll. They were poising upon the up-welling air currents from a brisk, north, offshore wind. One bird was an old adult, the other in younger stage of plumage. The older bird once made a swoop past the other, with partly closed wings. The eagles were much above the level at which gulls also were poising against the wind.

After this, eagles were recorded on February 22, March 20, 22, 30 and 31, April 12, and May 19. They were most frequently seen over the open ground or over Whalers Knoll where they appeared to be hunting, or in flight toward the east and high over the pines.

On the afternoon of February 22, an eagle in a tree in the barnlot across the road east of the Reserve was being pestered by a crow. The eagle flew up and over the edge of the Reserve, followed by two crows which drove it in a circle back over the barnyard. The crows called persistently and first one and then the other flew down twenty-five feet or so close past the eagle but without touching it. The larger bird showed a little response by sometimes swerving in its course and by circling higher.

An encounter between an eagle and two duck hawks was watched in the early afternoon of March 30. The eagle appeared to be looking for ground squirrels near the parking place by the base of Cypress Point. It flew westward, poising against the wind until it came nearly to a cliff where there were two duck hawks. Then these birds came out and the eagle promptly turned back landward, the falcons diving at it alternately, one or the other screaming all the time. At least three times as a falcon dashed down at the eagle the latter rolled over so as to meet the assault from above, with talons extended upward toward the attacker. It could not be seen that there was actual contact at any moment, but the bluff worked. The eagle was obviously on the defensive and made for the woods with heavily beating wings between each onslaught, soon disappearing into the woods toward Rat Hill and below the level of the taller tree tops. Only then did the falcons give up the pursuit and fly back to the cliff. Another pursuit somewhat similar to this was witnessed on September 23.

In the fall for a month beginning on September 21, from one to three golden eagles were regularly present in the Reserve. They were seen mostly in the vicinity of Whalers Knoll, along the western margin of the pines and over the open ground west of there. They seemed to be occupied mainly with hunting for ground squirrels. One was seen once on the ground among bushes. Part of the time was spent perched in the tops of tall, marginal pines; once one lit in the top of a tall dead cypress near the base of Cypress Point. Some days these birds were heard calling almost continuously. Apparently when the numbers of ground squirrels above-ground were reduced at the beginning of the season of hibernation the eagles moved off the area, at least for most of their activities. A single one was present on the morning of November 6.

Marsh Hawk

Circus hudsonius (Linnæus)

A marsh hawk in immature plumage (probably the same bird) was seen on four occasions in mid-winter and once in mid-summer. The first time,

December 10, it flew low over Whalers Knoll and on toward the south. On other occasions, January 4 and February 18 and 24, the hawk was hunting low over the patches of mustard and radish where sign of meadow mice was so abundant. Once it was seen perched on a lupine bush only three feet above the ground in the lea of pine woods. Small birds appeared to pay no attention to this hawk when it flew over them. One was seen on July 1, skimming back and forth over the grassland south of Carmel Cove.

This species was recorded three times in October. On October 8, in the morning, one was flying southeast of Whalers Knoll and later it was perched in some dead ceanothus on the south side of that hill. Two days later one was seen perched in the same place, and in the afternoon one was hunting low over the oats patch north of the Warden's House. It went to the ground several times. One was hunting over grassland in the afternoon of October 22.

At 8:30 a. m. on November 5, a marsh hawk that was hunting over the dead-oats patch kept a flock of meadowlarks on the move by its flight, although the hawk appeared to make no attempt to capture any bird. Finally it dropped to the ground where it caught a meadow mouse which it carried in its claws off toward the north. Within five minutes the hawk (or another one) was back and had resumed the search for prey. Four times in succession it dropped to the ground, but came up immediately without making a catch. With so large a proportion of unsuccessful pursuits it is easy to see why the mice become so timid that they keep constantly on the alert for predators. Apparently a mouse may have many encounters with a predator and still live. This gives opportunity for the action of natural selection in preservation of protective features of structure and habit. Later, a second marsh hawk joined this one.

During the morning of November 6, a marsh hawk foraged over Whalers Knoll and the meadow south of there. Once it flew over the tip of the point nearest the Seal Rocks and lit on a low pile of rubbish; another time it perched in the top of a sage bush. The next morning one that was hunting east of Whalers Knoll, went to the ground several times, with no successful result. Once it settled in the top of a baccharis bush; finally a successful catch of a meadow mouse was made.

Late in the afternoon of the same day a marsh hawk was discovered in the grass at the southwest base of Whalers Knoll. When a person started toward it from fifty feet away, the hawk flew up and lit one hundred yards off in a sage bush. From the spot it left, a ground squirrel whistled twice and then ran for thirty feet across a road and down a hole. Evidently it had been held down, but was not as yet seriously injured from the hawk's attack.

At 9 a. m. on November 8, three marsh hawks were seen at one time. One was in the top of a baccharis bush southeast of Whalers Knoll and two were in the air west of there. Later, one was seen several times in ceanothus bushes.

Duck Hawk

Falco peregrinus Tunstall

A pair of duck hawks seemed to have their interest centered along the coast somewhere on the north shore of Point Lobos. The first occurrence was noted on February 20 when one in adult plumage was perched from 8 to 8:15 a. m. on the highest tip of Bird Island. At the end of that time it flew off over the land toward the northeast. Although during the next three months this species was recognized fewer than a dozen times, it is thought

that a pair was present for most of the period. The birds were seen at many places along the shore and sometimes over the mainland, but most frequently on the seaward sides of Little Dome and Big Dome.

On March 28 near the Seal Rocks lookout two duck hawks were flushed from a cavity at the brow of the cliff directly above the pelagic cormorant roosting place. One (the larger) circled and flew back to the niche, perching on the conglomerate rock at the entrance. On March 30, when a golden eagle came near this spot the two duck hawks came out and drove the intruder back over the mainland and into the pine woods. They then returned to the cliff.

On every occasion that a duck hawk appeared over land there was much confusion among the small birds, followed by several minutes of complete silence. Once, about the middle of May, a duck hawk, perched in a dead tree on the west side of Big Dome, was seen picking a bird it had just captured. On May 14, a duck hawk flying near Bird Island stooped at a Brandt cormorant, which dodged down toward the water as the falcon resumed its course of flight.

On September 23, a duck hawk was noted twice, once in pursuit of a golden eagle toward the east near Big Dome and once in flight along the north shore of the main point. Two were seen in flight near Big Dome in the afternoon of October 9. At sundown on October 20, three duck hawks were flying high toward the west over the open ground west of the Warden's House. They called loudly and two of them were fighting. Five minutes later, two were seen again in the same place. In the evening of October 23, one was noted several times over the trees and over Carmel Cove.

A duck hawk was watched near Point Beach in the afternoon of November 4. It perched on dead limbs of a cypress near the southern shore and flew about in the vicinity. A sparrow hawk showed much concern at the presence of the larger bird and tried several times to drive it away.

Pigeon Hawk

Falco columbarius Linnæus

A clear view of a pigeon hawk was afforded on the morning of April 10 as the bird flew past a group of pines on the shore northeast of Bird Island. First, all the many Brewer blackbirds and linnets that were feeding on the ground flew to the tops of the pine trees and uttered alarm notes. Then, a few seconds later, the hawk appeared from the south and flew toward the north, paralleling the shore. It was not moving fast and apparently was on the watch for possible prey.

Sparrow Hawk

Falco sparverius Linnæus

The sparrow hawk was present continuously through the period of our study at Point Lobos. It is the only species of hawk found by us actually nesting on the area. One pair was located definitely, and there is some evidence that one or more other pairs nested there also. One or two individuals were seen nearly every day.

Sparrow hawks in flight were seen over all parts of the Reserve. Foraging individuals distinguished by their hovering flight were seen at many points over the open ground where the grass cover concealed meadow mice. Perches most frequented were the tips or ends of branches of small living or dead

pines either sequestered from the main stand or at the margin of it. As substitute perches, fence posts were frequently occupied. The taller poles supporting a power line were occupied as perches and lookouts even more often. Once one was seen perched on top of a large rock in a small exposed clearing close to the base of Cypress Point. The bird faced toward the southeast, into the wind.

Of the many times these hawks were seen foraging, only a few actual captures or results of capture were noted. Often a bird hovered and then resumed its flight without going to the ground. Other times one would drop, but would rise immediately, apparently after a failure. One that left a perch on November 26, appeared to capture an insect. On February 22, at noon, one was seen picking at some object held down by its feet on a dead stub of pine. At noon on March 22, a sparrow hawk carried some small animal which looked like a meadow mouse to the top of a dead pine southeast of Whalers Knoll where it perched on top of an attached cone and started to eat. About the middle of the morning on April 12, a hawk flew to a perch fifty feet up in the stub of a pine. It was carrying a large, live meadow mouse which it held by the back between the shoulders, and which it began to eat, first picking at the head.

Responses of small birds to the presence of sparrow hawks varied. On November 26, as a hawk flew over some flat, open ground where there was a flock of western bluebirds and Audubon warblers, these birds took alarm and flew into the air. In the same vicinity, on March 28, a sparrow hawk perched in a dead pine in the near company of Brewer blackbirds and linnets without alarming these birds in the least. However, on May 11 and again on May 19, when a sparrow hawk flew past the nesting colony of Brewer blackbirds near this place the blackbirds mobbed it vigorously. One was mobbed by cliff swallows on June 28.

Intolerance of the sparrow hawks toward larger raptorial birds and to other members of their own species was observed on several occasions. This was exhibited most often in the pursuits of red-tailed hawks by sparrow hawks, which were seen on November 8 and 18, February 22, March 24, April 9, June 20 and September 23. Pursuit of a duck hawk was watched on November 4, and of a Cooper hawk on November 6 and 7. Apparently, this was more than the expression of concern to be expected during the nesting season. On December 31, a sparrow hawk was seen in active pursuit of a burrowing owl. A hawk which was seen repeatedly along the shore in the southern part of the Reserve, and which was suspected of nesting in that vicinity, was watched on March 29, as it took a perch in a pine, and then took after and routed another sparrow hawk that happened along, going north.

The first sign of the approaching nesting season was recorded on February 18 when a copulating pair was seen in a pine. On March 29 a pair showed interest in a pine stub, with a hole in it twenty feet up, close to Blue Fish Cove. On April 25, the finally chosen nesting hole was located thirty-five feet up on the west side of a forty-five foot pine stump on the south shore of Blue Fish Cove. When the base of the trunk was struck, the brooding bird stuck its head out of the entrance and then flew out. On the afternoon of May 11 one of the adults came to this neighborhood carrying some object of food. Both parents were seen at the nest on the morning of May 15; probably the young had hatched by that date.

California Quail

Lophortyx californica (Shaw)

The California quail was one of the species that seemed best fitted to live at Point Lobos. It not only occupied a large proportion of the area, but was one of the most numerous of the resident species. Although in the small amount of time allotted to this species it could not be determined how many individuals or coveys were present, our records indicate that the winter total was about one hundred and fifty birds which seemed to be in four to eight coveys. Probably divisions and combinations kept the number of coveys changing constantly.

For the most part, quail inhabited the bush-covered portions of the Reserve. From the cover provided here the flocks moved out for short distances into the grassy areas and into the woods. They were observed especially around the bases of lone pines where there was some sort of screen. Various situations where particular flocks were observed were as follows. In the morning of December 12, forty or more in a covey came from the gulch of Gibson Creek and foraged in a compact group over the pavement of a strip of old highway. Later in the morning another covey was foraging on grassy ground by a picnic table along the southern shore. Another covey was seen repeatedly within the thick cover of baccharis, monkey flower, ceanothus, pine, and other plants on the north side of Vierras Knoll.

On February 22, early in the morning, a small group of eight quail was feeding at the grassy margin on the east side of Little Mound Meadow. The birds kept in a compact group and moved over a strip of ground about twenty feet long to the edge of a road where they turned back and walked to where they were seen first. Here they stood for a few minutes, each one bunched up in a resting position, between two low, rounded clumps of mixed chaparral. They kept within ten feet of these clumps when foraging, and once they started to run for cover but stopped and resumed feeding.

All through the winter and spring a large covey was present over the southern slopes of Whalers Knoll. The birds were observed here in the shade beneath the canopy of live and dead ceanothus and among the smaller, scattered bushes. Once thirteen were feeding in a compact group on sparsely grass-covered roadway in the saddle southeast of Whalers Knoll, but ran hurriedly to bushes ten feet away when disturbed. Several coveys regularly foraged among the patches of lupines.

The roosting location of one covey was discovered on December 10. At 4:30 p. m. the flock of about twelve birds flew up from the tall grass north of the Warden's House and to a low, rounded pine, one of a scattered group near Bassett Avenue. Half an hour later when it was nearly dark the birds were still in the tree. The next morning at 6:30 the same birds were found among the branches of the next pine north of the one to which they had flown in the evening. They were reluctant to leave—before full daylight—and when disturbed usually ran along the limbs of the tree. Some flew to a smaller tree. When the place was visited again a little before 9 a. m., the birds were on the ground feeding close to these trees and some adjacent brush-piles. On March 19, at 6 p. m., six quail flushed from a patch of wild radish in this vicinity and flew, part to the same tree in which the first bunch had roosted, and part to a pile of brush. (See pl. 15 fig. A.)

During a rain, at 2 p. m. on April 13, a group of eight quail was foraging between baccharis, sage, and ceanothus bushes east of Point Beach, where the grass and herbaceous plants averaged six inches in height. The birds

were picking at the heads of the plants and other portions of the green vegetation. Four hours later the birds, apparently the same ones, were seen on the opposite side of a thicket only fifty feet from the first location.

Beginning early in April nearly all the quail observed seemed to be definitely paired; however, for the next two months the flocks maintained their organization for most of the time. The groups were composed mainly of multiples of two, though more and more frequently single birds or pairs were detected. Males were seen often perched in the tops of tall bushes such as dead ceanothus or in low trees. Here they uttered single notes which in some instances sounded like calls of a piñon jay. About fifteen individuals were calling in this manner on May 19. During the preceding ten days only pairs and single birds had been detected.

A nest was found on May 11, after flushing the pair close to the site, one hundred and fifty yards east of the southeast corner of Mound Meadow, back among the pines. It was on a mound at the base of a small pine on ground grown sparsely to blackberry, poison oak, monkey flower and blossoming fairy lanterns. The site sloped slightly toward the west and was surrounded by pines and live oaks. The nest, a hollow globe lined with pine needles, contained a single egg when discovered. Although it was not approached closely, the disturbance was too much and the birds deserted it.

It was rather late in the fall before the young quail were fully grown. On September 17, at 8:30 a.m., a flock of twenty-five or more birds including young ones one-third to one-half grown was seen just west of the Warden's House. They were scattered over the roadway, through a live oak thicket, among lower branches of pines, and in the near-by grass. At 6 p.m. the same day two young ones were seen on the roof of the house. These and others in small pines near-by were evidently on their way to a roosting place.

On the afternoon of October 20, a flock was feeding in a lupine patch east of Vierras Knoll. When a Cooper hawk lit near them these birds uttered confusion notes much as would a flock of bush-tits. Later two dogs ran across this area and frightened the quail which flew off toward Gibson Creek.

Comparison is sometimes made between the habitats of the valley quail and the ground squirrel. We have heard the assertion that these two animals occupy entirely different sorts of surroundings. At Point Lobos the habitats of these two species coincided almost completely. The quail lived and foraged everywhere that the squirrels lived, though the squirrels did not occupy quite all the places where quail lived.

Black Oyster-catcher

Hæmatopus bachmani Audubon

Black oyster-catchers were present throughout the period of our observations at Point Lobos. This bird could be found by searching along the shore on almost any day. Nearly always two individuals were seen together, but three in one place were recorded on three different days. Places of observation extended from the vicinity of Bird Island, where most of the records were made, around the shore as far as the north boundary of the Reserve. (See pl. 22 fig. B, pl. 23 fig. A.)

Behavior that seemed to be typical of most of the activity of the oyster-catcher was watched along the south shore near the Seal Rocks lookout on

December 1. Three oyster-catchers and two black turnstones were all operating rather close together on sloping rocks where sheltered from the wind. While outside there was a lively chop, the groundswell was weak. The slaty black bodies of the oyster-catchers, even though a solid pattern, rendered the birds hard to make out at a distance. Movements of the birds were slow, save when the surge threatened, and the observer was reminded of the walking gait of coots. The oyster-catchers were looking over the alga-grown rock surfaces, mostly about three feet above the mean water surface. The tide was low. Now and then a bird would venture down to a lower level, when it became alert to the returning wash, clearly afraid of being engulfed. Sometimes the water did come up, to cover the feet and part of the tarsi. These birds distinctly did not wade. Of the three, two were inclined to keep close together, the other a bit aloof. One of the birds preened at length, standing on its left leg near the upper limit of the seaweed zone on the rock slope. It reached into rearward feather tracts here and there, and about the bases of rectrices. Its peculiar bill seemed quite effective in this process.

The foraging oyster-catchers, walking about inspecting the rock surface well covered with small-sized kinds of algæ, poked here and there, now and then seizing some small object, juggling it a moment between the raised mandibles, and then swallowing it with a quick gulp. Occasionally an oyster-catcher would prospect in one place, reaching under some object with quick, side-wise thrusts of the bill, but always it was a *small* object that was finally swallowed.

On the morning of June 20, an oyster-catcher was seen to make several trips from the outer side of the island west of Blue Fish Cove to various rocks along the shore of that cove. Each time it returned apparently carrying some food object to the same spot, probably to a nest site. When some persons walked down to the shore the bird became excited and uttered many loud notes of alarm. Two days later one was seen carrying food from the shore near the north boundary of the Reserve to this island.

On September 19, three oyster-catchers were watched on a rock off the north shore. At first there were just two; then the third one joined them and a pair went through a demonstration—bowing and bobbing with their bills pointed downward. Four in a group flying along the south shore on November 10, were calling loudly.

Killdeer

Oxyechus vociferus (Linnæus)

Flocks of killdeer were present occasionally during the winter. Beginning in February the species was present continuously and was noted singly and in pairs. It was not definitely determined whether more than one pair lived within the Reserve during the nesting season.

On November 29, at 2:40 p.m., on the grassy ground near the northern boundary of the Reserve, a band of more than twenty-five killdeer was encountered. Until they took flight in rather packed formation, calling, they had been perfectly noiseless and mostly motionless, scattered about on the green pasture land, heading into the west wind. Farther along, in an old-stubble field, there were four more birds.

In mid-afternoon of December 10, a group of seven killdeers was seen on the sand blowout south of the base of Cypress Point. On grassland near

this place and eastward close to the shore, January 2 and 3, a group of nine was seen.

By the time the nesting season had arrived the growth of plants over most of the open ground of the Reserve had become so rank that no extensive area was left that seemed to be suited to the peculiar needs of killdeer. A few narrow strips of ground, some not over twenty feet wide, were left sufficiently bare to attract these birds. A pair that remained to nest did not restrict itself to one continuous expanse of habitat, but divided its time between five or more, far separated bits of ground.

One or both birds were seen several times at the south end of the sand blowout on a small gravelly surfaced area. Also, they were seen several times on the lowest portion of the old site of Bassett Avenue after that strip of ground had been plowed and where it was then crossed by a small stream of fresh water. Another favorite site was the pebbly stretch of roadway along the south and west margins of Mound Meadow. They were seen frequently on the shore at Pebble Beach, at the largest patch of gravel along that shore. Here at noon on April 13, the two killdeers along with two western sandpipers flew down to the rocky beach and fed close to some black turnstones on rocks within the tide belt. A few times killdeers were seen in flight between two of these kinds of locations, even when they were on opposite sides of the pine woods.

The spot finally selected for the nest was on a smaller patch of killdeer habitat than any of the foraging areas. At noon on May 12, the two birds flew to the southern extension of the conglomerate outcrop west of Mound Meadow. They were more than ordinarily noisy and when the spot was visited whence most of the calls came, an empty "scrape" was found which later proved to be the nest. At 9:30 a. m. on May 14, there was one egg; a bird ran off when the location was approached. There were two eggs at 5:30 p. m. on May 16, three at 2:10 p. m. on May 18, and the full set of four at 5 p. m. on May 19. At this time both birds were near the nest. (See pl. 21 fig. A.)

On June 21, a carcass of a young killdeer not long out of the egg was found in the gravelly wheel track on a road about one hundred yards east of the above-mentioned nest site and on the west side of Mound Meadow. Apparently the bird had been on this small stretch of gravel (the only place suitable for it within many yards) when it was frightened at the approach of an automobile. Its natural reaction in such circumstances, to freeze and remain motionless, would result certainly in its being crushed beneath the wheels of the automobile. Here is an example of the failure of an instinctive protective device on account of a peculiar circumstance of civilization. It shows how unexpectedly human occupation of an area may interfere with the normal lives of animals.

Although killdeers were present in the general region through the rest of the summer, none was recorded in the Reserve until September 18, when call notes were heard. Several were seen that day on bare ground just outside the north boundary. On October 8, one was seen close to a ruddy turnstone on conglomerate close to the end of the point near Seal Rocks. This species was heard in the Reserve again on October 21; and on October 24, nine were counted on the strip of grassland that had been burned in September. Five were seen here on November 4, and several the following day.

Ruddy Turnstone

Arenaria interpres (Linnæus)

Noted once in the fall, on October 8, when a single individual was seen on the conglomerate close above the water at the tip of the point nearest the Seal Rocks. Later it flew off in company of a lone killdeer. This bird was above the narrow belt of dark-colored rocks and on a surface which it resembled closely in coloration.

Black Turnstone

Arenaria melanocephala (Vigors)

Black turnstones were recorded ten times during the winter between November 25 and April 24. Although this species was not noticed between December 23 and February 19, it may have been present all this time. Our attention was directed mainly to other parts of the area than those occupied by turnstones. Sometimes only a single individual was seen, but more often this species was in flocks of ten to twenty or even thirty birds.

Several times groups of turnstones were found foraging over the rocks in a small cove east of Seal Rocks. On December 1 two turnstones were watched here in company of three black oyster-catchers. They were all rather close together on sloping rocks in a place sheltered from the wind. The tide was low. While outside, there was a lively chop, the groundswell was weak. The turnstones were quicker in their movements than the oyster-catchers, following the lowering surges much more closely; but they were quick to avoid the returning wash, even anticipating a deluge coming over a ledge from out of their sight. The two birds kept close together, picking here and there in the sea-weed covering the rock surface, but it could not be seen just what they were eating. They were brisk foragers, rock-trotters, not waders, and were even more adverse to allowing the water to rise over their feet than the oyster-catchers. When approached within fifteen yards the birds took flight with two or three shrill, sputtery cries.

The experience recited above was repeated over and over. When the waves washed over a rock on which the birds were foraging, they would fly up just beyond reach of the water, but would settle again as soon as the water left. Sometimes the birds foraged on the shore of the mainland, but more often they were on the smaller rocks just offshore. Once, on December 12, two were seen bathing in a small pool on top of a rock. Another time, February 22, one was seen resting quietly on the highest point of an exposed, dry rock. (See pl. 21 fig. A.)

Return of this species in the fall was detected on September 18, when late in the morning one was seen along the rocky south shore, and in the afternoon two were seen on rocks close to the northern boundary of the Reserve. On September 20, a flock of about six turnstones was seen on a rock near Pebble Beach and several others were scattered among sea-lions on Seal Rocks. A single bird was seen on the mainland nearest the Seal Rocks on October 8.

At the time of high tide on the morning of October 10, nine turnstones were counted along the crest of a long rock close to the southern shore. The birds were about six feet above the water, perched quietly on the east side of the rock, exposed to the sun. Some were preening; others were squatted with their backs toward the sun. Evidently they were resting until the lowering tide would again expose their feeding places.

A single turnstone was seen on November 5.

Wilson Snipe

Capella delicata (Ord)

A single Wilson snipe was watched on the afternoon of September 18, as it flew to the south over the eastern part of the Reserve after being flushed from marshy ground just outside the northern boundary. Three more were flushed from this place on October 22.

Hudsonian Curlew

Phæopus hudsonicus (Latham)

Noted twice on northward migration. Two individuals were seen flying together around the tip of Cypress Point on May 11, and about 10 a. m. on May 20, three were seen flying northward across the base of the Point.

One that was watched on the morning of August 10, on the sandy shore at Gibson Beach, kept just above the water line.

Spotted Sandpiper

Actitis macularia (Linnæus)

A spotted sandpiper that was feeding on rocks near the eastern shore of Carmel Cove, at 3:45 p. m. on April 27, finally moved off to the north. At 5:30 p. m. on May 16, another individual was seen along the shore close to Pebble Beach. It moved toward the west. In the afternoon of September 18, one was discovered along the shore near the northern boundary of the Reserve.

Wandering Tattler

Heteroscelus incanus (Gmelin)

Wandering tattlers were seen on rocks along the shore on eleven dates, as follows: December 11, April 30, May 11, 13, 16, and 17, September 18, 19, 20, and 25, October 10. On each occasion (except once when three were together) only a single bird was seen and it was feeding over rocks close to the water. Several times waves washed over the feet of one that was being watched. As a rule these birds were rather timid and they were quick to move out of sight when a person appeared.

A foraging individual was watched on the afternoon of September 25. It was on a low rock just off the north shore near the base of Cypress Point. It spent most of its time where the rocks were light in color above the dark belt and where the light brownish gray of the bird closely approximated the background. Part of the time the bird was in pools on top of the rock, whence it picked up and swallowed objects. One, at least, of these appeared to be a snail.

Western Sandpiper

Ereunetes mauri Cabanis

At noon on April 13, two western sandpipers were feeding at Pebble Beach along with two killdeers and near several black turnstones.

The species was next observed on April 24 when a big northward flight took place in the morning. At intervals of about one minute between 7 and 9 a. m. groups of from six to 25 individuals flew across the peninsula in a line which would strike Carmel Cove. A large number, nearly three hundred at one time, stopped along the small stream which crossed the old site of Bassett Avenue at its lowest point. Here they bathed in the fresh water,

fed on animals which they found in it and on the adjacent mud, and kept so busy that they permitted approach to within fifteen feet without response. Occasionally a large group would fly up and circle toward the north and then return. Small flocks continually arrived and left. Not all that flew over stopped at this place In the afternoon two individuals were seen on rocks at Pebble Beach.

On May 12, in the edge of the woods on the north side of Mound Meadow, under a pine tree, a western sandpiper in full breeding plumage, dead for some time, was found. There was no sign of capture by hawk or owl; possibly it had struck a branch of a tree when in flight. The spot was in the line of flight mentioned above.

Red Phalarope

Phalaropus fulicarius (Linnæus)

Red phalaropes were noted individually or in small numbers during the northward migration on May 11, 12, 13, and 17. On May 11 one was on the water of Gibson Cove, swimming just outside the gently breaking surf, and two others flew by from over the land in a southwesterly direction. Two days later one at Gibson Beach was swimming in the water, and later was foraging along a line of drift on the sand. Another was feeding at a floating mass of drift in Blue Fish Cove.

On May 12, at Mound Meadow, five red phalaropes flew from the south-southwest, zigzagging up the slope among the pine trees. Like the gulls they cut across Point Lobos peninsula through or over the trees at this point. Later three more flew along the same route.

Northern Phalarope

Lobipes lobatus (Linnæus)

Northern phalaropes were observed in considerable numbers May 13 to 20, along the shore of Point Lobos. At first they were noticed usually in small flocks in the water close to shore, feeding at masses of drifting material. Some of them came out on the shore and fed at the line of drift on the sand, as at Gibson Beach. On the afternoon of May 13, four birds came flying in and lit on the waters of Carmel Cove and then went through elaborate bathing activities.

About noon on May 14, a lone northern phalarope rose from Gibson Beach and flew laboriously up the slope and over the land in a due north course. That afternoon a flock of 150 or more was feeding at floating drift northwest of the tip of Cypress Point. On the morning of May 17, hundreds, and probably thousands, of individuals were seen on the water just north of Seal Rocks. A portion of this large flock would rise when an especially high wave came in. Several thousand, mostly in flocks of twenty to two hundred, were watched on the morning of May 20, flying past the tip of Cypress Point.

A flock of twenty or more northern phalaropes was swimming on the water off the south shore in late morning on September 18.

Glaucous-winged Gull

Larus glaucescens Naumann

Glaucous-winged gulls were noted on most of our visits to Point Lobos from October 21 to May 14. They were usually seen in flight or scattered about on the water and on isolated rocks close to shore, foraging and loafing.

On December 22 most of a flock of 124 gulls counted on a big rock near Gibson Beach belonged to this species.

Two gulls of this kind were seen on November 25 in the water close to the tip of Cypress Point, fighting.

Western Gull

Larus occidentalis Audubon

The commonest gull at Point Lobos in 1934-35 was the western. We recognized this kind and made record of it more often than all the other species together. However, on some days more individuals of some other gull were seen than of the western. As a rule, for most of the period, not many minutes would pass without a glimpse of at least one western gull. This bird was seen in all parts of the area—in the water and on the islands and rocks close to shore, on the ground close to shore, or in flight anywhere, very often over the woods.

One conspicuous feature of the routine of western gulls noted many times was the great number often seen flying over the peninsula toward the north in the morning and back toward the south in the afternoon. These birds were usually high in the air and appeared to have little connection with the Reserve except that they passed over it on these flights between roosting sites and forage areas.

These gulls searched over a wide variety of forage ground. One favorite source of food was the refuse left at tables by picnickers and along the shore by fishermen. Another type of forage niche of a more nearly natural sort and rather peculiar to gulls was noticed several times. Along the sea-cliffs where the rock surfaces rose vertically out of deep water, when the tide was low, single, scattered western gulls were often seen swimming next to the wall, picking objects from it. Also the birds commonly fed over the rocks uncovered at low tide as well as at certain favorable spots on the ocean away from the shore.

Some items in our notes on this species seem to indicate that its breeding season is a long one. As early as November 18, twenty-seven western gulls were in sight, perching head into wind, some on bare rocks, others scattered out on earthy upper parts of Bird Island. The impression was strong that the birds were already "staking out" separate nesting precincts. All the gulls so posted were in full adult plumage; some others flying about were in younger stages of plumage. On December 14, two gulls perched close together on a rock near this island were displaying, with necks arched and heads pointed downward. Others were merely standing in scattered locations over the island.

At 8 a.m. on February 20, one hundred or more western gulls were perched at scattered sites over Bird Island and adjacent smaller islands. These were single birds or twos, usually standing, but sometimes squatting. They often uttered series of calls, sometimes closing the bill with each note, other times holding it opened widely during the whole series. One or two individuals were picking at green stems of plants, breaking them off and placing them on the rock surface beneath themselves. Then in a few seconds, the stem would be picked up, mouthed, and again dropped. This was repeated until the piece fell over the edge of the cliff and out of reach. All but one gull thus stationed was in adult plumage. The feet of each showed conspicuously pink in color, and this color extended up the lower portions of the legs.

Nearly three months later, on May 11, at mid-morning, forty-eight western gulls were counted in sight on Bird Island and the tops of smaller islands close by. Most of these were in pairs, the two birds standing close together. Two pairs were seen copulating. Single birds were squatting in spots more or less concealed by lush vegetation and these were thought to be on nests, for they remained in these spots continuously. Gulls were occasionally taking to flight or coming to land, but none was seen to carry anything.

At least one brood of two young gulls, about one-third grown was detected on one of the small islands here on June 19. The birds were standing and moving about in a small cavity in the rock and one parent was standing near by. On June 21, around fifteen broods of two and three young each were counted in the vicinity of Bird Island.

That the young gulls depend upon their parents for food for a long time was suggested by a series of observations made at Point Beach. On December 10, an adult was being watched as it perched on a rock in that vicinity. Within a few minutes a bird in immature plumage came and lit on the rock and evidently begged for food. The young bird held its opened bill near the head of the other one and uttered high notes, but the adult seemed to pay no attention to the begging. Almost exactly the same performance was seen at the same place in the afternoon of December 26. It was noticed again as late as March 21, this time on a picnic table a few feet up the shore from the first-mentioned site.

Most of the young gulls at Bird Island were in dark plumage and able to fly on August 10. A few, however, seemed to be still unable to fly. Most of the young birds still begged for food from the adults and all seemed to retain their headquarters at the nest sites.

On September 19, the young had left the nesting sites, but the adults were still stationed there—usually only one at a station—apparently in the same places in which they had nested in the spring. A few gulls in immature plumage remained in the vicinity, but they were wandering and apparently held to no fixed site. A young one was seen on a rock off the south shore on September 22, begging for food from an adult.

Many western gulls were seen in flight on October 8. At Bird Island, at 5 p.m., adults were distributed in pairs at much the same places they had nested. A pair was watched for about five minutes on the shoreward edge of the main island. One of these birds continually pulled up billfuls of plants and dropped them—within a radius of about two feet. Both birds kept their necks arched.

In the afternoon of October 22, a western gull was flying above and diving at a red-tailed hawk in the air north of Whalers Knoll.

Herring Gull

Larus argentatus Pontoppidan

Herring gulls probably occurred more frequently through the winter than the entries in our notes signify. They were noticed in small numbers, in flight or resting and feeding along the shore, on November 29, December 12, 22, 30, January 4, March 29, and May 14. The individual seen on the last date was apparently on northward migration.

California Gull

Larus californicus Lawrence

California gulls were recognized five times during the season. On November 30, a seemingly decrepit adult on Gibson Beach was approached to within twelve feet before it took flight and moved to the water beyond the surf.

On December 13 in the morning, several were noted flying northward over Cypress Point. This was the most numerous species of gull on the afternoon of February 19. On April 25, hundreds of gulls, apparently all of this species, were flying north along the coast and across the Reserve in line with Carmel Cove. They were in groups of about twenty, and these were stringing along all day, mostly high overhead. This was the only day this species was noted in such numbers. On May 13, six of these gulls not yet in fully adult plumage flew in a compact group over the Reserve toward the north.

Ring-billed Gull

Larus delawarensis Ord

Many groups of ring-billed gulls were flying north over and past the tip of Cypress Point on the morning of May 20. Flocks counted within an hour numbered 50, 6, 4, 11, 8, and 2. Several more flocks, numbering ten to fifty birds, were seen at the same place on the following morning.

Bonaparte Gull

Larus philadelphia (Ord)

Three groups, at least, of Bonaparte gulls in immature plumage were seen flying north past the tip of Cypress Point at about 9 a.m. on May 20. One of these numbered several hundred individuals, one contained only eight, and one about fifty.

Heermann Gull

Larus heermanni Cassin

A single Heermann gull in nearly adult plumage was seen flying north past the tip of Cypress Point at about 9 a.m. on May 20. All through the latter half of September and October this gull was numerous in the water about Point Lobos. Groups numbering up to twenty-five were continually flying past the tip of Cypress Point and feeding offshore. Sometimes they rested on the rocks and islands close to the shore. They were attracted especially to the sea-lions, both on the rocks and in the water, doubtless because the activities of these animals provided sources of food. The species was still present, though in reduced numbers, on November 9.

Royal Tern

Thalasseus maximus (Boddaert)

A single individual of this species was seen on the morning of April 24, flying north over the peninsula in line with Carmel Cove.

California Murre

Uria aalge (Pontoppidan)

A California murre was noted about 9 a.m. on May 20, flying north past the tip of Cypress Point. It was close to the water and not far from the land.

Pigeon Guillemot

Cepphus columba Pallas

Beginning on March 25, pigeon guillemots were seen rather frequently (10 records to June 20), in small flocks, at several places along the shore of Point Lobos. On March 25, one near the south boundary flew in and lit near the shore. A few minutes later it flew out over the ocean several hundred yards where it lit, and later returned to the vicinity of the shore.

A small colony apparently settled for nesting at Blue Fish Cove. In the morning of March 29, twelve were counted there, scattered about in channels and close in under rocks. Some were in pairs going through courting performances, facing one another. Their notes, a high-pitched, wiry *seep,* could be heard. There was much flying about. Only two were in sight on March 30. Between 9 and 10 a.m. on April 11, twenty or more individuals were seen in the cove and on the rocks of the island at the west side of it. They were scattered mainly in two's and three's. There were many pursuits in which one or both birds finally dived and swam under water for a few feet. These took place both from flight and from swimming positions. On May 13, there was much flying back and forth by ten or more birds seen in the cove. One bird was seen several times in a crevice in the rocky wall on the east side of the cove. This behavior was continued on the 15th when about twenty individuals were present. One bird of a pair was begging—opening its mouth widely and showing the lining of the same bright coral-red color which is so conspicuous on the legs and feet.

Between fifty and a hundred adults were observed along the north shore on the morning of June 20, between Blue Fish Cove and Big Dome. They flew back and forth from crevices in the rock walls of islands and the mainland, apparently carrying food to young birds. One was seen carrying some long object dangling from its bill.

Another location where this bird was seen repeatedly was in the vicinity of the cormorant roosting cliff on the south side of the point by the Seal Rocks. Five guillemots were noted in the water here on May 11, and at least three pairs on May 20 and June 23. On the morning of May 11 two were seen singly flying north past the tip of the point.

Adults were present on August 12 around the island west of Blue Fish Cove and in about the same numbers as earlier in the summer. Young birds, partly feathered, were seen in at least two crevices and adults were watched carrying food to them. Excrement on the rock wall of the island marked the locations of several nests. Adults were present in two's at several places on the rocks and in the water. Apparently the whole colony left this region as soon as the young left their nests. (See pl. 22 fig. B.)

Ancient Murrelet

Synthliboramphus antiquus (Gmelin)

A single ancient murrelet was noted twice in mid-winter on Carmel Cove. In mid-afternoon on December 26, one was seen in the weak surf close beneath the bluff. It was under the water more of the time than on the surface and it dived long distances. Twice, the bird "stood up on its tail" and flapped its wings. The same, or another, individual was noted here again on January 3.

Band-tailed Pigeon

Columba fasciata Say

Band-tailed pigeons were noted on six occasions from March 25 to May 19. On March 25, one flew from the top of a tall pine east of Mound Meadow, stopped in another tall pine one hundred yards to the south, and then moved on to the south. Five were seen in this vicinity on April 28. One of them uttered a rasping note before it lit and then cooed several times. All of these birds came from the southeast and moved off toward the northwest. One in flight toward the south was seen on May 12. On the morning of May 15, a pair flew from a large dead pine near Blue Fish Cove. That afternoon and on May 18 and 19, three to five individuals were seen in the tall pines east of Mound Meadow.

Mourning Dove

Zenaidura macroura (Linnæus)

The mourning dove was recorded only once in winter, but it was observed regularly as a summer resident after April 24. On December 11, at 6:45 a.m. when it was barely light enough to see, a dove was seen in flight over the open ground north of the Warden's House.

Doves in the area foraged on most any portion of the open ground. However, they selected for perching and resting locations the branches of pines at the margins of the woods and at isolated positions out in the open. Often, but not always, a dead limb was selected. Once a dove was found in dead ceanothus on the southeast side of Whalers Knoll. Late in the afternoon on May 14, one flew to a limb close to the ground in a small pine beneath a heavy growth of trees on the south side of Little Dome. A favorite congregating place, especially toward evening, was in the vicinity of the tall hydrant at the north edge of the woods. Apparently the birds came for water; this was one of the few spots where fresh water was always available.

A final estimate placed the number of doves in the Reserve in the early part of the nesting season at ten pairs.

A nest was discovered on May 17, ten feet up on a horizontal limb of the last pine on the south side of the road at the northwest corner of the woods. The site was directly over the road. A bird was brooding at 7 a.m.

On July 1 a mourning dove was heard at intervals cooing from one of the scattered pines along Bassett Avenue. At 7:30 in the evening on August 10 a lone mourning dove was seen in flight along the shore in the southern part of the Reserve. These were the only occurrences recorded in late summer and early fall.

Road-runner

Geococcyx californianus (Lesson)

Resident road-runners were seen repeatedly at four separate locations in the Reserve. However, since usually only one individual was seen at one time, it was impossible to tell how many of the birds were present. The total was somewhere between four and ten; probably nearer the latter figure.

Headquarters for each road-runner, or pair, seemed to be in an area of tall bushes, mainly ceanothus in this locality. From such centers the birds foraged out among the smaller bushes or the adjacent grass-covered ground, sometimes as far as a quarter of a mile. When disturbed by a person, either on foot or in an automobile, a road-runner out in the open would nearly always immediately cease its hunting activity and after a brief survey of the

situation, it would hurry back to the protective cover of the tall bushes. Sometimes a road-runner would forage along the margin of the pine woods or even for a short distance among the trees if these were scattered, but none was seen in the main woods. These birds showed a marked tendency to travel along the roadways and paths, probably on account of the freedom of movement permitted there. Also, it may be easier to sight prospective food objects in such a situation than amid the dense tangle of grasses.

Foraging road-runners were watched many times. On the morning of February 19, one was hunting among bushes on the sandy ground south of Point Beach. Twice within a few minutes it picked up objects. On February 24, one came out of the sage bushes at the base of Whalers Knoll and hunted over the green grass, keeping within ten to twenty feet of the edge of the brush belt. It was plainly capturing and swallowing large insects. Now and then it would squat low, fluffing out its plumage laterally, remaining thus for a minute or so, and then stand erect with crest raised and tail slowly moving up steeply and then down. When followed closely, it became alarmed and made a short flight over the bush-tops to an opening back in the chaparral. Another time on the afternoon of April 16, one walked along a pine log southeast of Whalers Knoll and made a quick dart, as if capturing a lizard; but the latter was not seen. In the afternoon of May 1, a road-runner was hunting among logs and stumps under pines near Blue Fish Cove. It swallowed a fence lizard, but the actual capture was not seen. (See pl. 9.)

Not all of the time was spent by road-runners on the ground, for each individual seemed to have certain favored perching places where it might be found often. One bird was seen three or four times in the same tall ceanothus on top of the ridge near the base of Cypress Point. On November 26, the bird jumped from a limb of this bush about eight feet up, when approached. At 9 a.m. on December 13, it was on a bare branch of the same bush, in the open but facing the northwest, and partly beneath another limb a few inches above its back. From this perch it could have a clear view of the surroundings, in several directions. There had been rain most of the night and part of the morning, and the bird may have been still at its roosting place. It was gone half an hour later. Again, at 11 a.m. on March 21, a road-runner flew up from the ground and perched in a dead portion of this same bush, as a person stood within fifteen feet of it. It remained for about ten minutes and finally flew off fifty feet or so toward the west. While on the perch, the bird raised its feathers and exposed its back to the weak sunshine, and then preened.

The mannerism of raising the feathers to expose the skin of the back to the sun, mentioned above, was seen several times. Sometimes this was noted when the bird was standing on open ground, with its tail touching the ground. Twice this pose was seen when the bird was on a rock on top of a hill or ridge.

The series of cooing notes given in the breeding season were heard first on March 23, from a bird on Vierras Knoll, perched on a rock, preening and sunning itself with raised feathers. On March 28, three road-runners were seen together in this vicinity, one of which may have been an interloper from outside the Reserve. On April 22, a pile of feathers on the west side of Vierras Knoll indicated that one of these birds had been killed and eaten there.

Late in the morning of May 1, the rattling note of a road-runner was heard southeast of Whalers Knoll and the bird was found twenty-five feet

up in a pine. This was repeated in the same neighborhood in the afternoon. A short distance away, toward Blue Fish Cove, an old nest of a previous season was discovered, nine feet up in a bushy live oak growing at the margin of the woods.

Twice on September 23 a road-runner was noted foraging along the fire trail and from there out into adjacent grass. Apparently it was catching grasshoppers. It seemed to prefer to walk on bare ground where this was available. The bird flipped its wings open widely at intervals of a few seconds, possibly to frighten the hoppers into action so that they might be detected more easily. This explanation of that behavior is only a surmise; it was not definitely verified.

Once, on August 11, a road-runner was discovered in the narrow roadway south of Vierras Knoll. It kept in the road ahead of an automobile which was speeded up to pace the bird. At the rate of exactly ten miles per hour the bird appeared to be too closely pressed and it suddenly veered off into a patch of lupine bushes on the uphill side of the road.

Barn Owl

Tyto alba (Scopoli)

At least one barn owl had its headquarters in the tall pines in the northwestern portion of the wooded area during the spring. It was seen in this vicinity on April 15 and 18 and was heard in the evening on April 17, 24, 25, and 26, and May 20.

On September 20 a barn owl was discovered in a daytime roosting place about twenty feet up, next to the main trunk of a small pine in the middle of the woods. The tree was hung heavily with lichens. The bird kept its perch when a person walked directly below it several times. It was seen at the same place each morning and evening until the 26th, the last day of that visit to the Reserve. The ground beneath the perch was littered with pellets, mostly fresh ones. These were picked up and their contents examined to learn what the owl had been eating. The lot contained remains of mammals only. One hundred and forty-nine separate skulls representing eight kinds of mammals were found, as follows. *Microtus* 71, *Thomomys* 43, *Reithrodontomys* 18, *Neotoma* 12, *Peromyscus maniculatus* 2, *Mus* 1, *Perognathus* 1, *Scapanus* 1. It seems likely that all these animals were caught within the Reserve. When this site was next visited, on October 9, the owl was not in the tree, but several pellets on the ground had been ejected after the first lot was gathered. Barn owl calls were heard at night on October 22.

Screech Owl

Otus asio (Linnæus)

Calls of a screech owl were heard early in the morning, before daylight, on May 15.

Great Horned Owl

Bubo virginianus (Gmelin)

A pair of horned owls lived on the Reserve for at least a portion of the time. On December 12, at 6:30 a. m., a horned owl was flushed from a pine out a ways from the main stand. Half a dozen times between that date and May 2, a horned owl was flushed from a daytime perching place in the pines, usually in a large tree in the woods south of Rat Hill. When disturbed the bird would fly off at half tree height to another perch. The

roosting headquarters of an owl were discovered in a dense live oak thicket along the highway just south of the southeast corner of the pines. An owl, disturbed here on May 2, flew off to the north into the pine woods.

The approach of the pairing season was suggested by the behavior of two horned owls on December 31. Just before dark, at 5:25 p. m., deep hoots were heard and a few seconds later the two birds flew through the pines close to the Warden's House. They were about thirty feet above the ground, one close behind the other. The hinder one uttered a harsh *squoick*. The birds must have alighted in the pines a short distance to the south, for the harsh note was heard several times more; but there were no more hoots.

Several times during October great horned owls were heard in the evening and one or two individuals flushed from tall pines on the southwest side of Rat Hill.

Burrowing Owl

Speotyto cunicularia (Molina)

Burrowing owls were noted as occasional visitors to the open, grassy ground near the northern boundary of the Reserve. Two were flushed separately, on November 29, from mounds at ground squirrel burrows. They flew off in different directions to points outside the Reserve. Again, on December 31, one was being pursued by a sparrow hawk in the same vicinity. The owl lit on a ground squirrel mound where the hawk made two stoops close past it before it flew to another mound.

Black Swift

Nephœcetes niger (Gmelin)

Two black swifts were seen late in the afternoon of June 18, flying back and forth high over the pines in the vicinity of the Warden's House. They were in company of several violet-green swallows. In the late afternoon of June 28, at Vierras Knoll, two black swifts and occasionally a third one kept in the vicinity, flying high and at a distance, but occasionally dashing by rather close. No notes were heard. Two were seen high overhead in the middle of the next afternoon. Again on August 11, in the evening, two were detected high in the air in the vicinity of Bird Island.

White-throated Swift

Aëronautes saxatalis (Woodhouse)

A small colony of white-throated swifts was resident at Point Lobos or somewhere in the near vicinity. A flock of approximately the same number of birds (14 counted on February 22) was noted many times after November 26. These birds were seen repeatedly in flight at about the same hour in late afternoon, and over the same part of the peninsula, over the margin of the timber southeast of Blue Fish Cove. Individually they kept well apart, and yet the aggregation hung together. They drifted a bit, but in general seemed to be poising against the north or northwest wind where it was deflected upward by the steep north shore.

Later, in the spring, this species was seen in smaller groups flying over all parts of the area. The birds were heard and seen most often on clear and warm days. There was no clue as to their whereabouts on cold, cloudy days.

On the morning of April 10, ten or more individuals were watched flying over a section of nearly vertical sea bluff northeast of Bird Island and over

the adjacent shore and water. Often one flew toward the face of the cliff, but turned just before reaching it. Certain individuals entered two crevices, one of them many times. At the time of each entrance there was much chattering. Although the birds were noted in this vicinity many times after this, no definite indication of nesting activity was detected again until May 17, when birds were seen copulating in the air over the mainland a short distance away.

Another place where swifts may have nested was on the vertical, shoreward side of the small island just west of Blue Fish Cove. In the afternoon of April 25, a lone bird flew to and entered a crevice in the rocks here and about fifteen feet above the water. It left five minutes later. Two days later, at 5:30 p. m., the twittering notes of swifts were heard from crevices at this place. On June 20, swifts were seen entering and leaving crevices at three different places in this vicinity. They were silent on these trips and traveled singly.

Later recordings of this species were as follows. June 28, two; June 29, one; June 30, one; August 10, two; August 11, three.

Anna Hummingbird

Calypte anna (Lesson)

Beginning on January 2, Anna hummingbirds were recorded at Point Lobos thirteen times up to May 20. It was impossible to tell whether each occurrence represented a separate individual, except that at least two males and one female were distinguished. For the most part the birds were seen at separate places each time.

On January 2, on the mainland nearest Bird Island, a female suddenly appeared and lit on a lupine bush. It then went to a sonchus plant and gathered the white pappus until there was a conspicuous fluff of it fully half an inch in diameter in the end of its bill. The bird then flew off in a course nearly straight, but a bit undulating, toward the background of dark pine woods outside the Reserve on the southeast, where apparently it was building a nest.

Not far from this location, on the mornings of February 20 and 25, a male was found stationed in a small gully close to the shore. It spent most of the time perched in the top of a baccharis bush in the bottom of the gully. It made flights to feed at flowers of monkey flower and Indian paint brush, usually hovering, but sometimes perching, in front of a flower. At least four times it "towered" and dived at other birds, mainly white-crowned sparrows in the tops of nearby bushes.

On March 19 and April 12, a female or young bird was seen feeding at flowers of radish in the patch on open ground north of the pine woods. One of these flew off toward the north. On April 29, one was watched on the hill southeast of Whalers Knoll, feeding at flowers of a mint, monkey flowers, and scrophularia. Others were seen at various places in the pine woods, mostly feeding at flowers of monkey flower. Single Anna hummingbirds were seen on June 28 and 30.

Beginning in August and continuing on through September and October and into November, at least one Anna hummer kept its headquarters in the flower garden at the Warden's House. Two males were seen here on October 21; one pursued the other. Geranium and fuchsia seemed to be the favored flowers. On November 8, one was seen in a clump of ceanothus on Whalers Knoll.

Rufous Hummingbird

Selasphorus rufus (Gmelin)

The period during which rufous hummingbirds were present at Point Lobos on their way north was a long one. This species was definitely recognized on nine days from February 19 to April 24. Many individuals, noted at various places in the area, were in rapid flight toward the north. One seen on February 23, was only about twenty feet above the ground surface.

At certain spots individuals were seen repeatedly which may have been the same birds. For example, on the two extreme dates given above, as well as on several others, a rufous hummingbird was feeding at the flowers of non-native plants (fuchsia, etc.) in the back yard of the Warden's House. At other places in the Reserve this species was noted feeding at flowers of wild radish, monkey flower, Indian paint brush, and scrophularia.

Allen Hummingbird

Selasphorus alleni Henshaw

Of the two kinds of hummingbird present at Point Lobos in summer, the Allen was by far the more numerous. Beginning on February 22 when the first one was detected, this bird was observed almost daily through the spring and summer. However, because of the long flights regularly made by the birds, when they quickly moved completely out of sight, this was one of the most difficult species to count accurately. Another complicating factor was that the males and females occupied two separate types of environment for nearly all of the time. While it seemed certain that no fewer than fifteen females lived on the area, not more than one-third this number of males was detected.

The first Allen hummer observed was a male. In the afternoon of February 22, it flew to perch on a twig sticking out about three feet above the ground in a small brush pile close to the site of Bassett Avenue. From there it flew to a radish patch close by and proceeded to feed, moving rapidly from blossom to blossom (these being whitish to pinkish lavender in color). After a little more than three minutes of visiting flowers from three inches to two feet above the ground, the hummer flew to a twig of pine, twelve feet up, wiped its bill many times, fluffed out its plumage, and left.

Several males apparently established themselves at various places on the slopes and on top of Whalers Knoll. Here they were seen feeding at flowers and perching on twigs of ceanothus. A male was seen, on March 20, on a dead twig in the top of a ceanothus bush west of Little Mound Meadow. Another one, on the same day, was diving in display flight over a ravine south of Vierras Knoll. On April 22, a male was diving at a female perched in a ceanothus bush on the north side of Vierras Knoll.

Females were scattered, at many places, through the pines. They perched usually on bare twigs, from near the ground to the very tops of the trees. Another type of place where females were seen regularly was in the patches of tall, dead ceanothus. This species was recorded as feeding at several kinds of flowers, including monkey flower (most commonly), Indian paint brush, tree tobacco, wild radish, and a kind of mint.

The first definite indication of nesting in this species was detected on April 16, although this activity must have begun several weeks earlier. On that morning a female was gathering willow cotton from a tree southeast of the Warden's House and was flying off toward Rat Hill with it.

A nest found on April 18, was four and one-half feet up on a twig one-eighth inch in diameter, at the lower, outer end of a limb of live oak. The tree was southwest of Rat Hill and was within fifty feet north of the margin of the extension, to the northeast, of Mound Meadow. The two young hummers in the nest had just hatched. They had dark brown, nearly black skins, with two rows of down on the back. Shells of the egg still remained in the nest. The brooding female flew off and perched at several places, in the top of the oak and in pines, twenty to thirty feet above the ground. The birds were still in the nest on May 2, but they had left by May 11.

A female, apparently still building, was seen on May 15, at a nest fifteen feet up on a small twig of a dead limb on the east side of a large pine. The tree was on an east-facing slope near Blue Fish Cove.

Another nest, found on May 18, was at least seventy feet above the ground on a small stub beneath a slender limb of pine in the woods east of Mound Meadow. The female was building with material gathered mainly close to the ground, around the trunk of a live oak.

At mid-day on June 21, a group of a dozen or more Allen hummers (probably young birds) was congregated on a steep west-facing bank at the extreme southeastern corner of the Reserve. They were feeding at the bed of brilliantly colored flowers which covered the bank. The flowers were nasturtiums and other plants escaped from gardens. At least three individuals were seen here on June 28. The next day a hummer was seen pursuing a cliff swallow.

A female watched on July 1 at the edge of pine woods near Mound Meadow was very nervous. She kept flying from perch to perch overhead and finally went down into the clump of young pines where there were some blackberry vines trailing through the lower branches. Here there was a full-grown young hummer which was able to fly.

Belted Kingfisher

Megaceryle alcyon (Linnæus)

The belted kingfisher was noted five times during the winter. The dates were November 26, December 14, January 2, and March 20 and 28. The single individual seen each time was in flight over the land or was along the shore of the southern portion of the Reserve, near Pebble Beach, Bird Island, or Gibson Creek.

One that was moving along the southern shore in the morning of September 21, perched several times on rocks of the bluff. On October 10, two kingfishers flew together toward the west along the south shore. A single one was perched at noon on October 20, on the bluff on the east side of Carmel Cove. One was heard on November 13, along the south shore.

Yellow-shafted Flicker

Colaptes auratus (Linnæus)

A yellow-shafted flicker flew up, at 9 a.m. on December 14, from the patch of leafless lupine bushes near Gibson Creek. It was in company of red-shafted flickers.

Red-shafted Flicker

Colaptes cafer (Gmelin)

Flickers were more numerous at Point Lobos than any other kind of woodpecker. The large size and conspicuous habits of this bird insured

that it would be noticed practically every day. The number present in the Reserve varied, being greatest in winter. An estimate on January 5, placed the number present at that time at forty-two. The largest number actually recorded for one day, twenty-five, was for November 27. Several occasions when fairly large groups were noted were as follows. On November 29, thirteen flickers were seen together in the line of pines north of the main woods or in flight toward those trees from the ground within a hundred yards radius. From the open ground sloping toward the northeast at the base of Cypress Point, on December 26, eleven flickers were flushed, successively. They flew to the surrounding cypresses. On January 2, twelve flickers were watched around the margin of Mound Meadow, flying back and forth from the ground to margining pines.

By the end of February all except the resident flickers had moved out of the Reserve. This left less than half the highest number noted above. Possibly as many as ten pairs nested on the area, although only five sites were definitely located.

This woodpecker ranged practically everywhere in the Reserve except possibly on some of the ground covered with tall grass and herbaceous plants and far removed from any tree. It is likely that even these spots were foraged over at some times of the year. The forage ground, then, was everywhere—on bare ground, on ground among grass and herbaceous plants, in bushes, and in trees. Perching places included such objects as posts, rocks, roofs of buildings, as well as stumps and dead trees of all sorts, and living bushes and trees. The birds were seen on the brink of the sea bluff and in the midst of the heaviest woods, but they occurred most often around the scattered trees and stumps at the margin of or entirely outside the main woods.

Some more specific examples which illustrate the type of habitat normal for a flicker in this vicinity are suggested by the following. In winter, on one day: two perched in leafless bush five feet above ground one hundred and fifty yards from nearest trees, in weak sunshine, both flew to ground; two in dead pine flew to nearby large rocks, then to ground, and back to tree; five in one cypress; one flew out of last clump of cypresses on Point; several on main trunks of cypresses; one perched on small dead branch of pine, in weak sunshine, in open woods, flew to larger limb twenty-five feet up in nearby tree. Another day: one flushed from ground at edge of opening bounded by sage at top of bluff along south shore, one hundred and fifty yards from nearest trees; two more in next clearing, when disturbed flew to picnic table and to top of nearby sage bush. On two days one was seen perched within the crown of a pine on the south rim of Whalers Knoll, in shade. In the same vicinity one perched in a dead ceanothus, exposed to the warm sunshine of late afternoon, but protected from the wind. One afternoon, two flew to the group of live oaks in the southeast corner of the Reserve, where they settled within the canopy of one of the largest trees and stayed there for several minutes. The above are samples of observations which were recorded many times and which, together, show how this bird spends its time during daylight hours outside the nesting season.

During a rather heavy rain on the morning of April 13, a flicker was seen clinging to the protected, north side of the trunk of one of the group of pines close to the shore northeast of Bird Island.

Evidence of the long period of preparation for nesting was noted as early as February 21, when one of two flickers on a dead cypress was displaying with spread tail. On the 24th the "song" of this bird was heard several

times. Two individuals were very active in the dead ceanothus tract on the south slope of Whalers Knoll. They would fly from place to place, utter squalls and scythe-whetting notes, and perch on pines or dead snags of ceanothus. From this time on, flickers were usually seen singly or in two's. On April 12, at 5:30 p.m., copulation was noted on a dead limb of pine, twenty feet up, close to Blue Fish Cove. One bird came from the open ground to the perch and called, and the other one came from the woods. The first one flew back to the open ground. This appeared to be typical mating behavior, as it was observed in essentially the same manner on several occasions. Each time, the female flew to some exposed perch and the call brought an immediate response. The sites of these meetings were not always in the immediate vicinity of the nest site; but usually at least one of the pair came from or returned to the vicinity of the nest.

These large birds were noticeably secretive in the neighborhood of their nests, so much so that the sites of fewer than half the pairs thought to be nesting in the Reserve were actually found. These cavities were all made for use the season they were found and they were in places not easily detected. As a rule they were farther within the woods than where the birds spent most of their time. However, the site in most cases was plainly indicated by the litter of excavated pieces of wood on the ground.

On April 26, a flicker was excavating at a cavity, just a little over six feet above the ground on the northeast side of a seven and one-half foot pine stump, among tall pines north of Mound Meadow. When disturbed the bird flew out and off, silently, toward the south. On May 11, the female brooding here flew off but remained in the vicinity and uttered alarm notes.

A second nest was found on the same morning as the above. Both birds were at the pine stump on the west side of Mound Meadow. One entered a large cavity twenty feet up, on the northeast side. The other moved over the stump and perched at various places. After about ten minutes it went to the nest cavity and the first bird came out and left. On the morning of May 14, at 7:50, a female flew to this stub and called. The male came out of the cavity, the birds copulated, and both flew away.

Twice within fifteen minutes on the morning of May 14, a male flicker poked its head out of a cavity twenty feet up on the south side of a dead trunk of a large pine in the southwest portion of the woods. The site was just above where a short stub was given off and it was screened on the east and south by the foliage on living branches of the same tree and extending above and below the site. Late on the morning of May 17, one member of this pair relieved the other at incubation.

On May 19, a newly made nesting cavity was found twelve feet up on the north side of an old pine stump which also contained a nest of pigmy nuthatch. This site was closely screened by live oaks and pines and was within the pine woods close to their southern border. At 10:30 a.m. the female poked its head out when the base of the stump was hit, and a few minutes later it flew off.

Late in the afternoon of May 20, the location of a flicker nest was determined definitely in a tree where the birds had been noticed several times previously. The dead trunk of the tree had eight woodpecker holes on its north side. When the base of the tree was pounded, a flicker called from off up the east slope of Whalers Knoll, but the one on the nest did not leave until after the disturber had walked away. A few minutes later it returned and entered one of the newly made cavities.

In the fall, record was made of flicker behavior on several occasions. At 4:30 p.m. on September 19, several were watched on the western side of Whalers Knoll. They were mostly on the ground, on rocks, and in the tops of ceanothus and other bushes. Some of these birds were calling and posturing in the warm sunshine, after a day of fog. On September 21, when a golden eagle flew over grassland west of the pines, several flickers flew up with meadowlarks and went toward the trees. Another time they flew to some bushes when disturbed by the close approach of a person. A flicker was seen at 9:30 a.m. on October 8, drinking at the top of the tall hydrant in the pine woods. On November 6, a group of about eight flew from the ground around Point Beach to some near-by dead cypresses. Both males and females were in the group. Males called and postured and then all of them flew to the ground.

Acorn-storing Woodpecker

Balanosphyra formicivora (Swainson)

Single birds were recorded three times in late September. Late in the morning on the 23d, one perched momentarily in the dead top of a cypress near the tip of the point and then flew off toward the east. It made no sound. Early on the 25th, one was heard and seen in the top of a dead pine at the east margin of the top of Rat Hill. It finally flew off toward the east. The next morning one was heard in the southern part of the pine woods.

Lewis Woodpecker

Asyndesmus lewis Gray

At 8:30 a.m. on April 27, a Lewis woodpecker was seen mid-way up in a pine on the north margin of the pine woods. One was found at noon the same day in a pine at the south margin of the woods near Mound Meadow.

Red-breasted Sapsucker

Sphyrapicus varius (Linnæus)

An occasional red-breasted sapsucker visited Point Lobos during the winter. The species was recorded four times. One was seen, December 12, at the north edge of Mound Meadow, picking at the trunk of a pine half-way to the top. On December 30, a sapsucker was seen at work on a transverse row of pits twenty feet up on the trunk of a live pine. The tree was sixty-six inches in circumference four feet above the ground. It looked thrifty, though abundantly pitted from about fifteen feet upward as far as could be seen. Later, the sapsucker flew to a nearby dead pine on which there were no pits and pounded for a long time, apparently after insect larvæ. Then it went back to the live tree.

Again on February 18 and 20 single birds were seen foraging on the boles or main branches of large pines, half-way to the tops of the trees. One of these was only a few feet from a Nuttall woodpecker, but paid no attention to it. Several live oaks in the eastern part of the woods showed sapsucker borings in the bark of their upper branches.

Hairy Woodpecker

Dryobates villosus (Linnæus)

At least two pairs of hairy woodpeckers nested at Point Lobos. Although no more than five individuals were definitely detected on any one day during the preceding winter, it seems likely that more than that were present.

These woodpeckers foraged over all of the pine timber, and to some extent in the cypresses, but they exhibited preferences for certain portions of the woods. On the afternoon of November 25, one that was foraging with a flock of small birds was feeding over the trunks and dead limbs of pines, mainly within twenty feet of the ground. Later, a male was watched on the underside of a limb of a dead pine at the margin of the pines north of Mound Meadow. Another male came and lit in the same tree. After a few calls the two birds settled to feeding and paid no further attention to each other. Then one flew fifty yards along the edge of the timber to a living pine. Farther along, also on the line between the pines and the meadow, three more hairy woodpeckers were feeding in the same fallen dead pine. Hairy woodpeckers were seen in cypresses, both living and dead, several times in September and October.

In one of the line of standing pines north of the main woods, on November 29, a hairy woodpecker was working on old branches studded with cones, eight to twenty feet above the ground. At 3:30 p.m. when the sun was getting low, this bird called *spink* fourteen times in one minute, after it had been disturbed by a too close approach. On October 9, at 5:45 p.m., one was pounding on the trunk of a pine, where it was too dark to register on a Weston exposure meter, model 650.

Two males were seen watching each other close to the base of a pine tree near the Warden's House at noon on February 20.

When the nesting season arrived, the two pairs of hairy woodpeckers appeared to segregate themselves, one occupying that portion of the pine woods east of Mound Meadow and the other staying north and west of that district. Within each division of woods the birds ranged widely. At 5 p.m. on February 18, in the eastern division, a male was drumming at a sunny place on the trunk of a pine. There were about four series of beats each minute and these were ten to fifteen seconds apart. Each series lasted about one and one-half seconds. The bird kept the same perch for the whole time. In this vicinity on March 29, two hairy woodpeckers were very noisy, pounding, drumming, and calling. They drove off a flicker that lit on a dead pine bole close to them.

At 5 p.m. on April 23, a female came off a nest to forage in the pines southeast of Mound Meadow. The cavity was thirty feet up, on the north side of a leaning dead pine trunk one hundred feet east of the corner of the meadow. It was a new excavation, the highest of a series of three of about the same size. When the trunk was rapped the next morning the female poked its head out but did not leave. Both parents were busy on the morning of May 12, carrying food to this nest; this food they gathered mostly from the trunks of pines within one hundred yards of the site. By May 19, the young birds were so large that they made considerable noise.

The second nest was found on April 26, near the northwestern corner of the pines. At 6 p.m. the pair flew together for a hundred yards to the north of the nest tree and then the male returned and entered the newly made cavity thirty feet up, on the north side of the tree. Birds from both nests appeared to leave at about the same time each evening to forage. On May 20, the parents at the second nest were noisily foraging for young birds in the nest.

Downy Woodpecker

Dryobates pubescens (Linnæus)

On January 2 and February 22, single downy woodpeckers were found foraging high in the pines along the eastern side of Mound Meadow. In

the fall, on September 21, 24, and 25, one or two individuals were seen each day in pines, cypresses, and dead and live ceanothuses.

Nuttall Woodpecker

Dryobates nuttallii (Gambel)

Twelve times between November 25 and April 30, a Nuttall woodpecker was recorded on Point Lobos. Each of these birds was in the pine woods and most of them were noted in a small area of woods just east of Mound Meadow. One was seen on the hill southeast of Whalers Knoll, one between the Warden's House and the highway, and one in an isolated tree at the eastern end of Bassett Avenue. The usual foraging place was forty feet or more up in the tree on the main trunk or a large limb. Sometimes one worked at an old cone for a moment.

On September 19 and November 4, a Nuttall woodpecker was watched in a pine near Bassett Avenue, north of the Warden's House. On the morning of September 21, one was seen near a downy woodpecker in a dead ceanothus close to the southern margin of the pines. Another, in the afternoon of September 24, was in the pines south of Rat Hill.

Arkansas Kingbird

Tyrannus verticalis Say

Noted once, as a transient, on April 12, when one was seen at 2:30 p.m., perched on the north boundary fence. The bird then flew to a power line and on to the top of a pine near the shore.

Cassin Kingbird

Tyrannus vociferans Swainson

A Cassin kingbird was seen late in the afternoon of October 10, perched in the top of a bush close to Point Beach. It was close to a Say phoebe. When disturbed by too close approach, the kingbird flew off toward the north.

Ash-throated Flycatcher

Myiarchus cinerascens (Lawrence)

Three times during the spring transient ash-throated flycatchers were seen that had halted on the peninsula for a short time on their northward migration. At 1 p.m. on April 26, one was seen in a pine one hundred feet west of the Warden's House. On the morning of May 17, one was perched in a dead ceanothus bush close to the path at the base of Cypress Point, and another, on May 20, was observed in a similar situation on the south side of Whalers Knoll.

Black Phoebe

Sayornis nigricans (Swainson)

The black phoebe is one kind of resident bird which was conspicuously more numerous in winter than in summer at Point Lobos. A count made in early January placed the number of individuals stationed on the area at eight. In the early nesting season only one pair was found.

Each bird possessed a certain series of perches which marked its location for a large part of the winter. It remained close within this circuit and thus avoided close contact and conflict with other birds of the same or

closely related species. These home ranges with which we became well acquainted through frequent observation were mainly in two types of situation—along the rocky shore, and within but close to the margins of pine woods or chaparral areas. In the pines the birds usually perched within a few feet of the ground, on the dead stubs or limbs where these were shaded by the main crown of the tree. At certain times a bird would perch on or close to the top of a low tree; and some individuals showed a distinct preference for fence posts and the top wires of fences for perches. Most of these places were alike in providing situations where the birds could be within shadows most of the time. The more exposed (to light) perches were most likely to be used on cloudy days. Possibly this mannerism was more in the nature of a coloration-concealment device than a direct response to the warmth of the sun. The perches chosen also were alike in providing protection from strong, or cold, wind.

Sometimes black phoebes foraged from the tops of scattered lupine bushes. On cold days they went to the ground for their insects. Several times at Gibson Beach a black phoebe was seen foraging on drift on the sand, and it even perched on the bare sand.

In April a nesting pair of this species was noted several times at Carmel Cove. And on April 27, the nest was found. When the site was examined more closely on May 11, two nests were found, one occupied and one of a previous season. They were about ten feet apart and in similar situations, about fifteen feet above the sand, on the inside of an overhanging arch of conglomerate.

In the evening on August 11, at least three black phoebes were present in the vicinity of Vierras Knoll. After September 17, this species was again recorded in numbers every day.

Say Phoebe

Sayornis saya (Bonaparte)

The Say phoebe was noted regularly as a winter visitant between September 17 and March 28. A mid-winter count, made on January 5, indicated that nine individuals were present within the Reserve.

This species resembled the black phoebe in the manner in which each individual apparently kept to its own forage ground for the duration of its stay and kept separated from other members of its own species and, usually, of either species. However, even though individuals of the two species were seen close to one another on infrequent occasions, their habitats were distinctly different from each other. The black phoebe showed a decided preference for shaded places and the Say phoebe showed just as marked preference for open sunny places. The contrast was borne out even in the coloration of the two birds—in fact, the two types of habitat may have developed because of necessity for seeking places where the birds would not be conspicuous. Whatever the origin or explanation may be, there is abundant observational evidence to demonstrate this relationship between coloration in these species and the amount of shadow or light in the habitat normally occupied.

Notes made upon a Say phoebe on the afternoon of December 28, illustrate the usual manner of living of this bird in this locality: "2:11, have started to 'dog the trail' of a Say phoebe, the one on grassland between Vierras Knoll and the woods to the northeastward. 2:12, the bird perched 25 yards from me on top of low (2 ft.) baccharis; flies to ground 6 yards off, and back to same perch; 2:14, out into air 15 yards, 'clicks' something

from air and back; 2:14:45, out 30 yards to east, catches something in the air en route, and lights on leaning survey stake (18 in. tall), pounds something on stake, and gulps several times; quite an extraordinarily long time; preens; 2:17, still preening on same stake; 2:19, leaves 20 yards nearly to edge of woods, hovers 4 feet above ground irregularly several seconds, then stoops to ground, and thence off east 75 yards to post of fence at side of highway; then to next post, to ground, and back toward me to weed stalk 3 ft. up; then (2:22:30) off and lost to my sight. 2:30, relocated bird in same grassland, perched 2½ feet up on sequestered baccharis bush. (Meanwhile, I had been back around hill looking for him!) Quiet; preens. 2:35, out 3 yards, hovers over grass, lights on another nearby baccharis; 2:37, across 15 yards to weed tip, then quickly out, hovering over grass at three spots, 3 to 3½ feet above ground, each time going down into grass, but no visible result; then to first little baccharis. 2.39, to top of leafy lupine 4 ft. up; then out to hover, then east 60 yards to upper wire of highway fence. 2:40, back toward me, to hover, and alight on weed 2½ feet up. Then (2:41) across between me and woods to weed tip; hovers, and across to 'first' baccharis (2:41:15). 2:42, out, hovers, to dead bush top; 2:43, out 5 yards, hovers, then off to top of same live lupine (4 feet); 2:44:30, out to hover and back; out and back; to another live lupine toward road; to another; to ground; hovers; 2:46, northeast to fence. (Lost him over bank.) Hear his note twice over toward road-cut."

A phoebe at the location described above, probably the same individual, was watched at 5:30 p.m. on February 24, when a cold north wind was blowing. When first seen the bird was in a live oak beneath the edge of a pine at the south margin of the woods. It then moved, possibly because disturbed, to perch on a lower limb of the pine. The bird kept this perch, without moving, for about fifteen minutes, and left only when driven out by the too close approach of the watcher, and it returned as soon as the disturber had retreated. Evidently this phoebe was resting, probably for the night, in this protected place where the sunshine would hit for as long as it was above the horizon.

The next morning at 7:30, a phoebe at this location was out on the tops of lupine bushes north and east of Vierras Knoll. It moved quickly from perch to perch and watched the ground for food. This was the regular procedure on those days when it was too cold for insects to fly. One watched at 10 a.m. on February 23, on the grassy area north of the pines, was foraging by hovering three to four feet above the ground with rapidly beating wings, and dropping to the ground two or three feet in front of that position. The bird faced into the strong, cold northwest wind, but it was in a somewhat protected place. The manner of hunting employed was much like that used by a western bluebird at the same time and under the same conditions. Both these species were accustomed to searching for insects in the air and on the ground.

Aside from the tops of various kinds of bushes and other low plants scattered over the open ground which furnished perching places for phoebes, the wire fences were favorite outlook perches. On many occasions a phoebe moved from place to place along a fence, stopping on the second, third, or fourth wire or on the posts. Once a Say phoebe drove a black phoebe away from a certain stretch of fence, but an Audubon warbler and five western bluebirds in the same vicinity were unmolested.

When this species was first noted in September it was most numerous among the bushes on the north-facing slope near Point Beach where there

were many flowers on bushes and herbaceous plants, and many insects flying about them. On October 22, a Say phoebe was watched for half a minute or more in pursuit of a large insect which it repeatedly tried to catch. The bill-clicks were audible for a considerable distance.

Traill Flycatcher

Empidonax traillii (Audubon)

The single Traill flycatcher detected on June 28, down in the brush toward the bottom of the ravine at Gibson Creek, may have been an individual summer resident in or near the Reserve.

Wright Flycatcher

Empidonax wrightii Baird

A flycatcher noted in mid-afternoon on April 26, appeared to belong to this species. It was perched on a dead limb of ceanothus southeast of Whalers Knoll.

Western Flycatcher

Empidonax difficilis Baird

Close to twenty pairs of western flycatcher nested at Point Lobos. Eleven nests were discovered. The first arrivals in spring were noted on March 24. After that the species was noted daily. The last record of one was made on September 24.

Western flycatchers occupied nearly all of the pine woods. They were especially numerous in the area south of Rat Hill, where they perched in the tops of live oaks and small pines or on lower limbs beneath the canopy in larger pines. A pair was seen feeding beneath the canopy of a large clump of ceanothus in a dark place under pines east of Whalers Knoll.

Several times early in April pursuits and skirmishes between two individuals were noted, but the significance of these was not determined. The first nest-building was seen on April 27, although some nests had been built before that. A pair was watched at the north base of the hill between Mound Meadow and Little Mound Meadow. At least one of the birds was gathering material from ceanothus and poison oak bushes and carrying it to the south side of the trunk of a large pine where there were two small stubs about four inches long projecting three and four feet above the ground. Material was placed on both these stubs, but mainly on the lower one. The site was shaded by young pines to the southward. By April 30 a nest was nearly completed, on the upper snag. It held three eggs on May 11. Apparently this nest was relined and used a second time, for it held two eggs on June 23.

On May 13, a flycatcher on the eastern shore of Blue Fish Cove, judging from its behavior, was off a nest and about to return. Finally it flew to the vertical, rock wall of a narrow gorge; but the exact location could not be found nor could the bird be scared away.

Another nest, examined on June 18, was inside the garage at the Warden's House. It was about eight feet above the ground and supported by a flap of a piece of canvas that was hanging beneath the roof.

Eight other nests found between May 15 and 21 were in situations similar to the first one—usually settled in a shallow cavity in the main trunk of a large pine above a short stub. One was beneath a stub. Often a clinging vine of poison oak or some lichen provided additional support or screen.

Height above the ground was 4, 6, 6, 6, 8, 10, 11, and 35 feet. One nest was on the side of a slender pine only six inches in diameter. This one was under construction on May 20.

Two nests containing young were found on May 15. Out of six nests where the contents could be examined, four contained three eggs or young, one held four young birds, and one four eggs. In almost every instance the adult on the nest was reluctant to leave before the nest was almost touched. One or two pairs hesitated to return when a person stood within twenty-five feet of their nest.

The effect of a thorough cleanup of a portion of the pine woods by removing the dead limbs close to the ground along with the brush seemed to be to exclude this species from that area. Probably the chief factor here was the removal of satisfactory nesting sites. At one place in the woods one tree had been left with a few stubs and a clinging poison oak vine. This tree held the only western flycatcher nest within sight and it seemed to be the only one which provided a suitable site. (See pl. 13 fig. B.)

Wood Pewee

Myiochanes virens (Linnæus)

At noon on August 10, a wood pewee was watched for several minutes as it perched in small pines back of the Warden's House.

Olive-sided Flycatcher

Nuttallornis mesoleucus (Lichtenstein)

An olive-sided flycatcher, at 6:30 a.m. on May 16, was perched in the top of one of the highest dead pines on top of Rat Hill. It remained there, and its calls were heard, for half an hour or longer.

Horned Lark

Otocoris alpestris (Linnæus)

Noted twice in the fall, on September 20 and 23, when a flock of six or more birds was seen and heard in flight over the bare sandy area close to Point Beach. Possibly the same birds were seen each day.

Violet-green Swallow

Tachycineta thalassina (Swainson)

The violet-green swallow ranked second to the cliff swallow in numbers at Point Lobos. It was numerous in migrations and many pairs remained to nest.

Early in the morning on December 14, three or more violet-green swallows were seen flying over the open ground west of the pines and another one was seen later that morning near Gibson Creek. A swallow seen in mid-afternoon on February 23 may have belonged to this species. On March 24, the only swallow seen clearly among several feeding over the pines with white-throated swifts was a violet-green.

After this the species was detected nearly every day and in considerable numbers. On March 28, four swallows were coursing about over Mound Meadow with much twittering. Their center of interest was back in the pine woods, at woodpecker holes in a steeply slanting stub thirty feet up in a big pine. The swallows flew about through the branches, now

and then alighting on snag tips. The next day ten or more were flying high over Blue Fish Cove. At noon on April 12, about fifteen swallows were flying in the open extension northeast of Mound Meadow. They moved at midheight of the tall trees and perched on dead limbs of pines back in the woods. This repeated prospecting was continued, without any definite indication of nesting, until May 17, when one was watched in the late morning as it pulled lichens from a dead limb in a pine in the western part of the woods and flew off toward the north with them.

In mid-afternoon on June 29, a violet-green swallow was seen leaving a freshly dug woodpecker hole, facing north in a dead portion of a partly living small scrawny pine, thirteen feet above the ground. This was in the heavy woods east of Mound Meadow. After watching for awhile, it was decided that there were small young being fed inside the cavity. Both a male and a female swallow entered and left several times. In each instance a bird would come down out of the sky above the treetops in a steep swift dive directly to the hole in the tree, and into it without seeming hesitation. There was no fluttering in front of the hole. In leaving, the bird would come out quite as quickly and directly, save once when the male stuck its head out for half a minute, then fly off zigzag through the woods in low course, about on a level with the nest site and toward Mound Meadow. A departing bird did not circle up skyward among the tree tops close by.

Near Blue Fish Cove in early afternoon of July 30, a male violet-green swallow entered a hole twenty feet up on the north side of a broken-off dead pine. Later it entered again.

Tree Swallow

Iridoprocne bicolor (Vieillot)

Tree swallows were detected on several occasions definitely from the last of March on through the spring. Compared with the violet-green swallow this species was present in much smaller numbers and it seemed to be more closely restricted to the vicinity of the shore.

On March 29, a pair prospected at a stub top twenty-five feet up, on a slope near Blue Fish Cove. They were seen here again on April 24 and May 12. On the morning of April 10, several were flying and perching about dead stubs in a group of pines on the shore northeast of Bird Island. On April 25, in the morning, three or four were perched near, and clinging at the entrance to, a cavity occupied by pigmy nuthatches in a long, dead limb of pine east of Mound Meadow.

Rough-winged Swallow

Stelgidopteryx ruficollis (Vieillot)

On the afternoon of May 11, six or more scattered rough-winged swallows were feeding over Carmel Cove and over the open ground to the east and south of there.

Barn Swallow

Hirundo erythrogaster Boddaert

On April 17 a barn swallow was flying over the open, grassy ground near Blue Fish Cove. Later, on May 13, two were seen over Carmel Cove, and one or more individuals were seen close to the shore by the north boundary of the Reserve.

Cliff Swallow

Petrochelidon albifrons (Rafinesque)

The cliff swallow was not only the most abundant member of its family at Point Lobos, but it was probably the most abundant nesting land bird and possibly most abundant of any species. It was estimated that around six hundred individuals of this species nested on the Reserve. Cliff swallows were first detected on the morning of March 28 when about twelve were flying about the shore close to Bird Island.

Cliff swallows foraged in groups of various sizes over all parts of the area. The largest such group seen together was noted on the morning of April 29, at 7:30 a.m., when around five hundred were feeding over the open, grassy swale immediately south and west of the Warden's House. Later in the day, many were seen over the pines and open grassland. After rain began to fall none was seen.

The nesting birds were congregated along the shore in four main colonies, with scattered pairs at suitable places between these. Beginning at the south margin of the Reserve, the first colony was scattered about the cliffs in the neighborhood of China Cove. There were nearly a hundred nesting birds here. The largest colony was on the high conglomerate cliffs on the south shore near the lookout by the Seal Rocks where there were around two hundred birds. Another colony nested in a cave in the south part of Blue Fish Cove, and the fourth was on a north-facing cliff northeast of Carmel Cove. At least a hundred birds were congregated here. A few pairs nested beneath the eaves of the old cannery building. Because of the inaccessibility of the sites, and the difficulty in seeing them from a distance, the figures given above were mainly guesses rather than accurate counts. (See pl. 22 fig. A.)

The earliest evidence of these swallows gathering nesting material was noted on April 24, where there was still mud and water at the lowest part of Bassett Avenue. On May 11, some of the nests in the large colony along the south shore were nearly half completed; others were barely started. On May 13 and 16, the birds were actively building at the colony near the northern boundary. They brought material from a wet place in a pasture across the fence to the north.

On June 28, cliff swallows were constantly skimming the meadows and slopes close over the chaparral tops. One blunt-winged clumsy young one was giving food calls and being fed by an adult in mid-air. On June 30, one was seen being pursued by an Allen hummingbird. At this time, this was the most conspicuous land bird on the area. It was guessed that six hundred could be found foraging at any one time. On August 10 and 11, cliff swallows were continually in sight over the Reserve; but none was seen on later trips that season.

Purple Martin

Progne subis (Linnæus)

Purple martins were seen on two days in the spring. On April 26, at 4 p.m. and later in the afternoon, at least two pairs were noted in flight high over the south base of Whalers Knoll. The birds were facing the strong south wind and then drifted off toward the east. They uttered harsh alarm notes, possibly aroused because a sparrow hawk was hunting below them. About the same time of day on May 13, one was seen near

Seal Rocks lookout, circling over the shore and sometimes over the ocean, in company of many cliff swallows. Notes of martins were heard on June 29.

Steller Jay

Cyanocitta stelleri (Gmelin)

Steller jays were seen often enough at Point Lobos to indicate that one or two pairs were resident there. The individuals observed moved about too freely to make an exact determination of the total number. The two birds noted frequently in the small young pines close to the Warden's House may have been visitors from outside the area, or they may have been the ones which seemed to be located for nesting somewhere in the northern part of the pine woods. They were seen and heard often along the northern margin of the pines, but never at demonstrated nesting quarters.

The other locality occupied by this jay was on the eastern slope of Whalers Knoll, just west of Blue Fish Cove. Presence of the species here in the pines and cypresses was detected several times. On May 15, two jays were seen together in the cypresses and pines close to the point west of Blue Fish Cove. One of these postured, with begging notes, and quivered its wings and tail. A linnet nest in this vicinity contained broken shells of eggs. Possibly it had been robbed by the jays. On another occasion the presence of a jay caused much protest among small birds.

California Jay

Aphelocoma californica (Vigors)

The California jay was resident in the Reserve in small numbers. There seemed to be a slight increase in population at the beginning of the nesting season; instead of the two individuals detected in mid-winter, at least five pairs, and possibly more, nested within the area.

As a rule these jays lived in those patches of tall bushes—ceanothus, poison oak, and other kinds—close to or at the margin of the pine woods. Occasionally a bird was seen in the tops of tall pines, even at a considerable distance within the woods. A part of each jay's time was spent on the ground. That this species made a deliberate search for the nests of smaller birds was indicated by observations on May 16. Near the west end of the pines a jay came to a hole in a stump in which western bluebirds were nesting, soon after one of the bluebirds flew out. The jay perched at the rim of the cavity and looked inside and later returned to look again. Next it moved off through the tops of the trees. Another time, in late afternoon of April 23, a jay went to a nest of some sort, forty feet up, near the top of a pine, and picked at the inside as it stood on the rim. Apparently this nest was not occupied.

Nest building of California jays was observed as early as March 20. At 3:30 p.m. one flew from across the road at the extreme southeast corner of the Reserve, carrying a small stick in its bill. It lit on a telephone cable and about a minute later it flew to the live oak nearest the highway. It soon flew back to the telephone line where it was joined by its mate. The birds stayed on the wire and in the tree for half an hour, during which time a few calls were heard. Once one moved to a perch near its mate, spread its tail, turned back and forth across the perch, and sang. It then flew away. These same birds were carrying sticks on March 29. On April 10, the nest was examined. It was twenty feet up in the end of a

limb at the top of the tree, only a foot within the canopy. The nest was completed but empty. No bird was near it. On May 17, it held three naked young several days old. A brooding adult stayed on the nest until it was nearly reached. Then both parents came near and called excitedly.

At 3:30 p.m. on May 1, a jay carried a billful of fine stems down the southeast slope of Whalers Knoll, evidently for the lining of a nest in that vicinity, but the bird could not be traced to its destination. A pair had been seen in that vicinity several times previously.

On May 11, a pair of jays was seen in the morning in the chaparral west of Little Mound Meadow. After one was noticed carrying food, a search revealed the nest five feet up in a seven-foot ceanothus partly dead and supporting a poison oak vine. It was on the western slope near the top of the ridge and fifteen feet from a pine tree. The site was surrounded by a general thicket which included a broad-leafed grass, ceanothus, and poison oak. The nest was a shallow one containing four small, naked young and one egg. The brooding bird stayed on the nest until a person came within two feet of it. Then both adults showed considerable concern.

Two jays were watched near the southern border of the pines on May 15. One of them burst out with notes of "anger" when a Brewer blackbird came into a certain small tree. No nest could be found, although the behavior of this bird seemed to indicate the near presence of one. A second jay appeared almost immediately from the west.

In the fall, California jays came to Point Lobos in flocks. On September 24, in mid-morning, a loosely knit group of twenty-five or more birds moved from the direction of Whalers Knoll across to the cypresses on Cypress Point. First they lit in the tall dead trees near the base of the point, and then moved on into the living trees. Next, the whole group moved back toward Whalers Knoll, flying along, four or five at a time, and generally silently. Again on October 9, at 9 a.m., a flock was seen moving through the tops of the pines and over them along the shore east of Blue Fish Cove. They were strung along, only two or three birds being in the air at once.

Liking of this jay for acorns was demonstrated on at least two occasions. On October 10, at 8:30 a.m., one bird carried a green acorn from a live oak in the back yard at the Warden's House to a near-by pine where it was held on a limb and pounded. Another bird that was watched on October 20, in the southeast corner of the Reserve, apparently was picking acorns from a live oak tree. Several acorns were heard falling.

Yellow-billed Magpie

Pica nuttallii (Audubon)

Yellow-billed magpies visited Point Lobos for long or short periods but did not remain to nest. Four birds were seen repeatedly from November 26 to January 4. Their interest centered in the line of trees which extended northward into the open grassy ground from the pine woods. They foraged out over the open ground and flew to other isolated trees as far away as the shore of Carmel Cove. On November 26, a magpie was driven out of a pine by a shrike which had perched there first. (See pl. 14 fig. B.)

At 8 a.m. on April 17, a magpie was seen in a lone pine north of the Warden's House. Later it was in the pine grove close to the house and then it flew off toward the southeast. Again in May, on the 13th, 14th and 15th,

a magpie was seen repeatedly in and close to a large pine at the north margin of the woods.

One was present on the morning of November 5, in the pines west of the burned-over grassland.

Crow

Corvus brachyrhynchos Brehm

Thirteen times from November 27 to May 18 the crow was recorded within the limits of the Reserve. Usually one, two, or three birds were seen in flight high over the trees and often they flew separately. Occasionally one perched in a pine for a short time. A typical visit to the area by this species was watched at 6 p.m. on May 13, when two crows flew from the east and lit in the branches of the tallest dead cypress at the base of Cypress Point. After a moment they took wing and flew back over the pines and out of the Reserve toward the east. (See pl. 20 fig. B.)

Once, on December 11, three crows flew to meet a red-tailed hawk which they followed and mobbed; again, on February 22, two crows were seen pursuing a golden eagle.

Clark Nutcracker

Nucifraga columbiana (Wilson)

A lone Clark nutcracker was discovered on the morning of October 12, in the eastern part of the cypress grove. The bird was watched for fifteen minutes at a distance of fifteen or twenty feet as it stood on the ground, on bare limbs of cypresses, and on boulders, most of the time keeping in the shade. On the ground it fed in the leaf litter, digging with its bill, and several times it turned over pieces of old cow dung and picked at objects on their lower sides. It was silent and was notably tame, once permitting approach to within fifteen feet before moving.

Chestnut-backed Chickadee

Penthestes rufescens (Townsend)

About fifty chestnut-backed chickadees were resident within the Reserve. It was not practically possible to count these birds or even to determine how many were within sight in a single tree at one time; but an estimate based on the known locations of nests and of nesting pairs proved to be fairly satisfactory.

Foraging places of chickadees included all of the kinds of trees in the Reserve. The birds were seen in cypresses, at cones and toward the ends of the limbs. In the pines they moved mainly through the tops and the outer portions of the crowns. One flock in ceanothuses was foraging mainly over the dead branches. Others fed about the blossoms of these bushes. Sometimes these birds fed among the twigs of live oaks.

The first nesting activity of chickadees was noted on March 20, when a pair was found building a nest in a cavity seven feet up, on the south side of a ten-foot stump in a thicket of small pines near a road through the woods. The bird which carried the material was followed by its mate. By May 11 this nest contained large young birds.

Out of twelve nests of this species found in the Reserve, ten were at heights between four and ten feet, averaging about seven feet. All of these were in cavities in stumps of pine, most of them well rotted. A characteristic of these sites was that practically all were closely surrounded

by thickets of young pines or screened by low boughs of taller trees. The entrance then, while close to the ground, was hidden from ordinary view. The birds contributed to the concealment by making quick, silent flights to the nests without any pause at the entrance. They were especially secretive during early stages of nesting. By nesting at this low level the chickadees avoided the stratum normally inhabited by the pigmy nuthatches. This latter species might be a fierce competitor for any small bird attempting to nest in cavities within the horizontal zone frequented by it. Once, at least, a pigmy nuthatch was observed pursuing a chickadee. (See pl. 16, fig. A.)

Two nests were found at higher sites. One was found on May 12, twenty feet up in a broken trunk of a pine and only eighteen inches from a living trunk of the same tree. The other, found on May 14, was fifty feet up in a cavity in a crotch of one of the highest dead cypresses. It was nearly twenty feet above the tops of the surrounding live trees. Both nests contained young birds. Neither one was concealed by foliage.

The first brood of young chickadees seen out of a nest was discovered on May 17, in small pines in the back yard at the Warden's House. Two bob-tailed young ones were seen with their parents in a place where repeated search had failed to show the location of the nest.

The subspecies inhabiting the Reserve is the Santa Cruz Chestnut-backed Chickadee (*Penthestes rufescens barlowi*).

Bush-tit

Psaltriparus minimus (Townsend)

Bush-tits were present continuously throughout the year at Point Lobos. One hundred was finally decided upon as the number present at the beginning of the nesting season. Thus fifty pairs represented the minimum population for the Reserve during this one year. The area seemed to be not especially crowded, and apparently many more individuals could have been accommodated within the habitat offered to this bird.

All through the winter bush-tits were seen in flocks averaging about fifteen birds each. Definite counts made on various encounters with flocks were of 15, 6, 12, 16, and 20 individuals. These flocks were associated usually with those mixed flocks of small land birds which foraged together in winter through the trees and tall bushes. Bush-tits foraged indiscriminately through all the kinds of bushes and trees in the Reserve. However, there was some indication that these birds preferred to move at a certain level somewhere between five and fifteen feet above the ground. Individuals on the way to a destination higher or lower than this seemed to stay at this level as long as possible.

A typical, foraging flock of sixteen or more birds was watched in the afternoon of February 23. The birds were moving westward through the ceanothus on the southeast side of Whalers Knoll, feeding among the leaves, flowers, and small twigs. Also in the same bushes at this time were Bewick wren, ruby-crowned kinglet, and chickadee. Two bush-tits feeding in ceanothus on February 21, picked off parts of the flowers and dropped them. In the afternoon of April 10, a pair watched along the north shore by Blue Fish Cove foraged for more than half an hour in a low limb of pine on the south side of the tree and within ten feet of the ground.

On March 24, a pair of bush-tits was disturbed from a resting place where the birds had been quiet for several minutes, in low, flat ceanothus

bushes only about a foot high. This was the second time such a situation had been noted as a daytime resting place for this species. Once, on March 22, one came down to a clump of monkey flower and remained in it, quiet, for nearly five minutes.

Record of Nests of Bush-tit found at Point Lobos

No.	Date	Location	Feet from ground	Stage
1	Feb. 20	live oak	15	building; April 10, feeding young
2	Feb. 22	ceanothus	4½	building
3	Mar. 19	cypress	7	nearly complete
4	Mar. 19	ceanothus	6	nearly complete
5	Mar. 19	dead ceanothus	10	nearly complete
6	Mar. 20	dead ceanothus	8	half completed
7	Mar. 21	ceanothus	5	building
8	Mar. 21	cypress	10	nearly complete
9	Mar. 21	sage	4½	nearly complete
10	Mar. 22	pine	12	nearly complete
11	Mar. 22	pine	40	nearly complete
12	Mar. 23	ceanothus	9	nearly complete
13	Mar. 23	sage	4	nearly complete; April 8, 3 eggs
14	Mar. 23	live oak	10	nearly complete
15	Mar. 25	ceanothus	6	just started
16	Mar. 25	pine	15	half completed
17	Mar. 25	pine	35	building
18	Apr. 8	pine	12	nearly complete
19	Apr. 9	ceanothus	7	birds bringing material from nest 16
20	Apr. 10	pine	50	building
21	Apr. 11	pine	6	just started
22	Apr. 11	pine	6	one-fourth complete
23	Apr. 11	ceanothus	7	building
24	Apr. 11	dead branch of pine	6	incubating (?)
25	Apr. 15	live oak	20	young (?)
26	Apr. 16	live oak	7	nearly complete
27	Apr. 16	ceanothus	5½	young
28	Apr. 16	ceanothus	6	young
29	Apr. 16	ceanothus	5½	6 eggs
30	Apr. 16	ceanothus	8	young
31	Apr. 17	pine	12	incubating (?)
32	Apr. 17	sage	4	part destroyed
33	Apr. 25	baccharis	6	deserted
34	May 1	dead ceanothus	7½	building
35	May 1	ceanothus	11	used
36	May 2	ceanothus	6	used
37	May 13	pine	15	used
38	May 16	pine	18	building

The tabulation just given shows the important items concerning time, location, and stage of the nests of bush-tit found at Point Lobos in the spring of 1935. It shows that the nest-building season started late in February and that most of the nests contained young as late as the last part of April. A wide variety of kind of plant was used for support of the nests, nearly every kind of tree and bush on the area being used. Height from the ground of the nests averaged around eleven feet; it ranged from four and one-half to fifty feet (estimated). Because of the inaccessibility of the contents little effort was made to study these. However, there was

some indication that the sets of eggs were smaller than we had anticipated. Sets of six and as low even as three seemed to be complete.

Other information, dealing with these nests which can not be shown in a table, but which is important for a more complete understanding of the relations of this bird to its environment, is given in the following paragraphs. The numbers which accompany these comments correspond to those shown in the table.

(1) Nest in group of seven live oaks in southeast corner of Reserve close to highway and to Gibson Creek. Site at outer end of bough on south side of tree and clump. Much of material gathered from twigs and foliage of oak within ten feet of site, but the birds moved over the whole group of trees. Both birds carrying material.

(3) Nest on southwest margin of group of cypresses along north shore of Cypress Point near base; half-way to top of tree, over margin of low ceanothus which extended over ridge to southward; fastened among foliage six inches from a limb one and one-half inches in diameter. Birds carrying cottony material, apparently for lining; foraged through foliage of cypresses and ceanothus about equally; usually approached beneath canopy and moved upward to nest.

(4) Nest half-way to top of ceanothus near western margin of pines; on east side of bush and clump; fifty feet from pine on east; supported at end of bough and exposed on east side; entrance on north side.

(5) Nest two-thirds way to top of dead ceanothus festooned with lichens; in center of and nearly concealed by bunch of lichens; surrounded by dead and live ceanothus, poison oak and pines; partly shaded by pine; supported by small, dead twigs; exposed to east.

(6) Nest in center of nearly dead ceanothus on north-facing slope east of Little Mound Meadow; on western margin of a group of tall pines; supported by small dead twig and in center of clump of lichens; slightly shaded; surrounded by poison oak; the birds gathered material off in other dead ceanothuses.

(7) Nest on south side of ceanothus bush nine feet high and twenty feet across; beside path through cypresses; at north margin of clearing one hundred feet across, filled with sage, monkey flower, grasses and herbaceous plants, where the birds foraged for nesting materials.

(8) Nest half-way out from center of highest cypress in southeasternmost group at base of Cypress Point; almost completely shaded by tree, twenty-five feet high, standing at south side of top of ridge and adjacent to chaparral, sage, baccharis, monkey flower, and poison oak; one foot from limb three inches in diameter; exposed to strong south wind.

(9) Nest close to top of sage bush, fifty feet northeast of large clump of ceanothus at west base of Whalers Knoll; surrounded by sage, monkey flower and baccharis.

(10) Nest hangs from twig one-fourth inch in diameter four feet south of bole of marginal pine, with most of limbs below nest dead; on grass-covered ground surrounded by clumps of poison oak, blackberry, ceanothus, sage, monkey flower, and baccharis; birds carrying material from along margin of pines fifty yards away.

(11) Nest supported from top by pine limb one-half inch in diameter, three feet from end of branch, on south side of crown of tree half-way to top of one of tallest trees; birds gather material mainly from places as high as, or higher than, nest.

(12) Nest in end of bough on east side of living ceanothus half-way to top of bush on lower southern slope of Whalers Knoll; birds gathering material mainly from branches of dead bushes.

(13) Nest near top of nearly leafless sage bush at edge of chaparral on east-facing slope southeast of Whalers Knoll; in leafy part of bush, but plainly visible from east side; fifty feet from pines to south and west; tall ceanothus same distance to south; grassy open slope to east.

(14) Nest supported by twigs at end of bough, four or five feet in from periphery of crown of live oak and two-thirds way to top; tree beneath and on southwest side of tall pine; brown color of wall covered with dead oak flowers contrasts with color of oak leaves; in sun in afternoon.

(16) Nest near top of pine, suspended from small twigs above a main limb on north side of tree; birds gathering lichens from dead pines on adjacent knoll.

(19) Nest in end of bough of living ceanothus ten feet high and shaped by south wind, surrounded by small pines and ceanothus, almost past blooming; one hundred feet northwest of No. 16, from which birds brought material; that nest almost completely gone; possibly same pair.

(20) Nest in small branches four feet from end of limb on northeast side of crown of tall pine, one hundred yards from No. 19; birds gathered material from lower branches of pines and a monkey flower patch sixty feet back in woods.

(23) Nest within canopy of ceanothus bush on top of ridge extending northeast from Whalers Knoll; surrounded by poison oak, large pines, and a few ceanothus bushes, but mainly in the open; birds gathering material one hundred yards eastward at base of slope; once three individuals in the group which went toward the nest, but it was not determined how many carried materials; moved across open slope, stopping two or three times in tops of bushes.

(24) Nest supported in lower part of lichen-filled, small dead branch, lowermost on large pine, twenty feet east of path through pines on southeast slope of Whalers Knoll; surrounded by large pines and ceanothus; not securely fastened.

(25) Nest near top of spindling live oak at south base of Rat Hill; closely surrounded by live oaks and tall pines; adults making frequent trips to nest, apparently with food for young; first noted in bushes one hundred feet north; moved up through pines and down again to nest; later trips made to same vicinity.

(26) Nest in lower limb of live oak, on east side of tree; birds gathering willow cotton from tree among pines.

(31) Nest near end of small limb of large pine at northwest corner of Mound Meadow; on east side of tree; over, and west of, several live oaks and small pines; adult foraged through oaks and then flew to nest.

The extracts of notes given above are sufficient to show the great variety in choice of habitation in this species and the almost indiscriminate expression of this choice. From them we conclude that emphasis must be placed upon the details of these phases of the behavior of the bird if we expect really to know its life history.

White-breasted Nuthatch

Sitta carolinensis Latham

White-breasted nuthatches, usually in two's, were recorded on seven days during the winter, between November 17 and December 31. Most of these

birds (possibly the same two each time) were foraging over the main trunks and limbs of pines, in the mixed flocks of small birds which foraged through these trees. Both large and small trees were visited. One afternoon, December 1, a nuthatch was working along in sunny portions of the cypress grove, where it was well sheltered from the north wind, near the extreme tip of Cypress Point.

Late in the morning of August 10, a white-breasted nuthatch was watched as it foraged over the trunks of pines near the Warden's House. Once it flew into the air after an insect. Other individuals were seen, usually on the main trunks of pines and near other kinds of small birds, on September 17, 19, 24, and 25, and October 9.

Red-breasted Nuthatch

Sitta canadensis Linnæus

Red-breasted nuthatches were observed in small numbers as transients in the fall. Late in the morning of September 20, one flew from the east along the north shore of the Point toward the Seal Rocks and lit on the side of the last high mass of conglomerate. It foraged silently over the sides of the rock, which was covered partly with lichens, and it appeared to pick off many insects. Once it jumped to an adjacent low plant (*Eriophyllum*), but soon returned to the rock and continued feeding. Ten minutes later the bird was still on the same rock, and twenty-five minutes later it was seen at a point lower on the bluff. In mid-afternoon of the same day one was foraging along a dead limb of a large cypress near the tip of the main point. This one and two others, which moved over the main trunks of cypresses, were with flocks of transient small birds.

One or more individuals were detected among the cypresses on September 22, 23, and 24, and October 8. This species was noted on September 24 and 25, in pines near the Warden's House. At noon on September 24, a flock of six or more red-breasted nuthatches was observed foraging with chickadees over vertical rock walls and the foliage of trees in a deep cave-in on the west side of Blue Fish Cove.

One, watched on the morning of October 12, was flycatching for termites at the eastern margin of the cypresses. Another one was seen in the pines on October 24.

Pigmy Nuthatch

Sitta pygmæa Vigors

The almost continuous notes uttered by birds of this species, together with its large numbers and gregarious habits, attracted frequent attention to the small, permanently resident, pigmy nuthatch. Estimates based primarily on acquaintance with the locations of nesting pairs placed the number of individuals present during the breeding season at close to one hundred. In winter as many as nine were counted in one group.

The flocks of foraging nuthatches in winter moved with other small birds through all the wooded portions of the Reserve. Individuals searched for food mainly over the limbs in the upper parts of pines and cypresses. Often they picked about the attached cones of pines and among the clumps of needles at the ends of branches. The nuthatches were not restricted to the main areas of woods but they visited all the trees, even the isolated ones out in open ground. Several on the morning of October 12 were flycatching for termites in the eastern part of the cypress grove. A nuthatch, on April 13,

foraging during a rain, kept on the protected north sides of the main trunks of pines.

The breeding season for this species was a long one, with a prolonged period of preparation. As early in the spring as February 18, there were signs of pairing in this bird. In an excited flock high in a pine, one individual was seen feeding another. Later, on several occasions, a male (?) was seen to feed its mate.

Actual excavation at a nesting site was noted first on March 20. Just before noon, a nuthatch was digging fifteen feet up on the west side of a twenty-five-foot pine stump. It left the cavity, barely started, but returned again in five minutes. More than a month later, on April 24, a nuthatch, then out of sight, was still digging at this cavity. From the third week of March until the end of April, nuthatches were observed daily all through the pines, usually in two's; but sometimes three or four were together. They stayed mostly about dead stubs of pine, and excavation for nests was the main activity observed.

Thirty-eight occupied nesting cavities were found, all of them in pines or dead remains of pines. The sites selected were high ones, averaging thirty feet above the ground and running as high as sixty feet. Only seven nests were found lower than twenty feet and only two under ten feet. Sometimes the excavation was started at some crevice or break already existing in the tree, but more often, and especially when the wood was partly decayed, it was started on a plain surface. Once a cavity started by a hairy woodpecker was deepened and occupied by a pair of nuthatches.

Pigmy nuthatches appeared always to dig hurriedly and persistently. A digging bird was repeatedly stopping to look about momentarily. A nuthatch digging on March 24, kept on the alert, apparently for intruders, although once two other nuthatches close by seemed not to disturb it. However, it was more concerned at the presence of a western bluebird and left its digging to drive one away from a nearby limb. The bluebirds were the most serious competitors of this species for nest sites, and in several instances, in which the entrances were of sufficient size, they temporarily or even permanently ousted the smaller birds from a cavity. Nearly always in such cases the nuthatches had been the excavators, but the larger birds seemed usually to be the aggressors. At one stump where nuthatches were digging only two feet below a bluebird's nest, there were alarm notes and activity when the bluebirds were near. The nuthatches usually retreated, but they sometimes kept on working.

The birds at one nest showed great excitement when a hairy woodpecker came near. Chickadees were competitors of close to nuthatch size. Once one was seen pursued by a chickadee, and at another time one was chasing a chickadee. In general, however, these two species avoided one another by nesting at wholly different levels.

One pair of nuthatches which was feeding young chased away a male linnet and, later, a violet-green swallow, from the vicinity of the nest.

During the incubation period nuthatches seemed less reluctant to leave their nests than other hole-nesting birds. Apparently, the males regularly carried food to the brooding females. An example of this habit was recorded on May 14. An adult was seen to enter a nesting cavity and fifteen minutes later one came and fed an adult that came to the entrance from inside the hole, begged, and took the insect. Then both flew away. Four minutes later the female returned and in another minute the male brought food which it took into the cavity, and then it left.

By May 16, most all the pairs appeared to have young in the nest. As yet no young birds had been distinguished out of the nest. Both parents carried food to the nestlings. A family group of six individuals was seen on June 29 in the pine woods.

Brown Creeper

Certhia familiaris Linnæus

Brown creepers were rather constantly resident at Point Lobos, but not in large numbers. An estimate made on January 5 placed the number present at that time as six. After becoming better acquainted with the area and after the birds had become more localized for the nesting season it was still not possible to determine the exact number, but five pairs seems to be the most reasonable figure.

All through the winter, creepers were seen with the drifting flocks of small birds which foraged through the pines. They moved over the trunks of large and small trees from close to the ground up to a height of at least forty feet. They were seen most often at about twenty feet. Creepers seemed to be in pairs even in winter, for when one was found a search usually disclosed another on an adjacent tree. A slight preference was shown for the thicker stands of trees, especially where there were old trunks, but this bird followed other species even out among scattered young trees; probably the whole area of pines was covered. Creepers that sometimes were found foraging alone were probably only temporarily separated from their companions. Once, on March 20, a creeper lit momentarily on the ground and then flew on to another tree. On April 15, one was seen to fly out twelve to fifteen inches and catch a flying insect.

First indications of the nesting season were noted on March 24 in the pines south of Rat Hill. Two birds were seen thirty feet up, close to a piece of loose bark on the east side of a tall dead stub. One of the pair went behind this bark and then came out and clung to the trunk. Some sticks and needles could be seen in the crevice behind the bark. Creepers were watched feeding young here on May 18.

On March 28, a pair of creepers was watched in the first "draw" within the pine woods from the south. At first the two were going together up one trunk. One flew off to another trunk, and the remaining bird disappeared in or on a lodgement of pine needles behind a stick also lodged among clambering poison oak, about twelve feet up, against the east side of the trunk and festooned with lichens. Later the bird was seen to sprawl out, with wings spread, on top of the needle mass. It went up the trunk and back again to the needly clump and disappeared. Doubtless it was starting a nest there, or inspecting a nest site. The other bird kept on trunks of nearby trees within one hundred feet.

On April 15, two creepers were found foraging on pine trunks near the margin of the timber east of Mound Meadow. One flew to the other and was fed by it; after this the two birds foraged separately. Possibly the bird fed was a female just off a nest. Two days later, two creepers were seen on the larger trunks in this vicinity, one of which was thought to be carrying cottony nesting material.

A pair of creepers was watched making frequent trips with food, on May 2, to a crevice behind loose bark, twenty-five feet up, on the west side of a poison-oak-covered dead pine stump in the southern part of the woods. The stump was in a slight opening surrounded by many pines and much low growth and brush. The birds foraged mainly within one hundred feet of the site.

On May 20, a nest of creepers was found at noon, three feet up in a crack in a rotten pine stump ten feet high among the pines southeast of the tall hydrant. The site was surrounded by large pines, the nearest twenty feet away. There were some logs close by on the ground. More than half the stump had rotted away. Several large feathers had been placed in the floor of the nest. Four young birds in dark gray down could be seen. Both adults visited the nest at the same time, each carrying food to the young. (See pl. 17 fig. A.)

Wren-tit

Chamæa fasciata (Gambel)

No fewer than fifteen pairs of wren-tits made up the winter and early spring population of this species on Point Lobos. This estimate of numbers may be far too small, for without paying especial attention to this one species it is not easy to detect the presence of these birds or to determine the area occupied by each pair.

Throughout the area, wren-tits were detected regularly in each patch of chaparral where ceanothus, baccharis, or sage combined with other bushes to make rather tall thickets. The patches of lupine and other low scattered bushes seemed not to be occupied. Such places as the slopes of Whalers Knoll, the side of the gorge at Gibson Creek, and the dense ceanothus patches at the base of Cypress Point supported most of the birds here.

At noon on April 10, a wren-tit was seen in the shrubbery beneath the pines on the north side of Rat Hill. Another was watched on the afternoon of May 18 as it moved from the chaparral southeast of Mound Meadow through the pines for at least a hundred yards along the eastern edge of the meadow. It kept at an average height of about twenty feet. Notes were heard from it once.

House Wren

Troglodytes aëdon Vieillot

Only a small portion of the pine woods had been permitted to reach a stage of development suitable for occupancy by house wrens. During the spring migration, beginning on March 29, several individuals were noted singing in the pines where there were thickets and fallen tangles of dead trees. These birds dwindled until only two pairs were definitely known of by the time they began to nest. On April 11, a wren at a dead trunk of pine on the west shore of Blue Fish Cove was singing and driving away other birds. The next day one was singing in a thicket of pine close to the ground along the north shore one hundred yards west of the old cannery. Another, watched on April 15, that had been noted repeatedly during the previous six days in the group of pines close to shore northeast of Bird Island, chased a male linnet from the lower part of the stump which the wren seemed to claim.

On the morning of April 25, a pair of wrens was found established for nesting in the pines on the small hill in the southeast part of the pine woods. One bird was singing and displaying, with widely spread wings. The other was carrying sticks to a cavity, twenty-five feet up in a three-inch dead stub of a living pine. One stick, too large, was dropped. Late in the morning, when the wren was gathering material from the ground beneath a small pine, it was pursued by a chipping sparrow. A wren near this nest was carrying an insect on May 15.

Another nest was discovered on the morning of May 2, by watching a wren carrying sticks into a hole twelve feet up, near the top of a stump in the pines

southeast of Mound Meadow. The site was only fifty feet from the edge of the pines. The bird was singing between trips. Twice a stick about a foot long was dropped after it was almost inside the cavity.

House wrens were seen in various chaparral areas on June 28, September 24, October 8 and 20, and November 6 and 18.

Winter Wren

Nannus hiemalis (Vieillot)

On twelve days between September 24 and March 24, winter wrens were recorded. It was not possible to determine how many individuals were present at one time or for the whole season. The following summary of observations on the individuals noted shows the nature and variety of places inhabited by this bird in winter.

November 25, 11:30 a.m.: One in low, four-foot cypress at side of path near tip of point came within three feet of observer.

November 27, 8 a.m.: One in low plant beneath pine by shore of Blue Fish Cove; another on ground beneath low, dense cypress top just above ground at top of bank on north shore; at 10:30 a.m. one in small, recently assembled brush pile in pine woods.

December 1: One in dense wild blackberry tangle beneath spindling ceanothus in pine woods in draw south of Rat Hill.

December 11, 5 p.m.: One in dead cypress near Blue Fish Cove.

December 13: In morning, on ground beneath cypresses on Point; in afternoon near ground in blackberry tangle in hollow south of Rat Hill.

December 23, 4:10 p.m.: One in tangle of brakes and blackberry vines at northeast base of Rat Hill.

January 5, 2:45 p.m.: In woods due east of Pebble Beach, one in tangle of poison oak and pine litter on shaded floor of woods.

February 18: One on sticks in woodpile in evening.

February 19, 10-10:15 a.m.: One foraging on north shore of main point. At first it was on the ground where there were low bushes and herbaceous plants under a foot in height, covering more than half the surface. Then for a few minutes it was on and about a rock about four feet in length, beneath a cypress. Then it moved into the cypress, first among the dead branches and twigs and then in the foliage of the living portions of the tree. It went as high as twenty-five feet above the ground—to the top of the tree. All this time the wren was silent.

March 18, 23, and 24: One each day at same place in tangle of plants around base of a large pine close to the highway where a small stream entered the woods south of Rat Hill.

September 24: One among ferns and poison oak at base of pine in same place as above. Later, another in low growth on north side of Rat Hill.

October 20: One in late morning in bushes at north base of Whalers Knoll.

November 5: One in low cypress thicket northeast of Whalers Knoll.

Bewick Wren

Thryomanes bewickii (Audubon)

All through the winter the Bewick wren was one of the common birds at Point Lobos. The species was seen daily and in considerable numbers; on November 25, there were as many as twelve or fifteen individuals. An estimate, made on January 5, placed the number present within the Reserve at eighteen. Later observations made it seem likely that more than twenty-five

were present at one time in winter. However, with the coming of spring the wrens either moved outside the area or became so secretive that their presence was mostly overlooked. It is probable that the first explanation is the true one for the scarcity of records after March. The species was detected on only two days in April, two days in May, and one in June. No special search was made for it.

The habitat occupied by Bewick wrens at Point Lobos included practically all the brush and tree-covered portions of the Reserve. Records kept on one day, November 25, show in part the range of situation over which these birds foraged. In the morning one was watched feeding in the lower branches of a cypress near the tip of Cypress Point. At noon one was in a sage clump at the base of Cypress Point. Later, another was found in the dead, lower limbs of pines at the margin of an opening in the pine woods. One, probably the same as the last, was in the brush and grass at the base of a large pine tree. Also one was seen among dead branches and brush close to the ground beneath pines along with a flock of foraging small birds. At 3 p.m., two wrens were seen at once in a recently accumulated pile of brush, in weak sunshine, on the floor of open pine woods. In a minute or so, a third bird moved into and out of, the same pile, from a similar one fifty feet to the west. A wren foraged, successively within a few minutes, along a pine limb where it picked at bases of attached cones, on the ground at the margin of pines, and around the bases of two marginal pines.

The next day several individuals, in lupine and sage bushes, were foraging on the ground, and six or more among the cypresses were within the branches or along with juncos on the ground beneath the trees. Other recorded types of winter habitat for Bewick wrens included the following: blackberry tangle along a fence; dead and living ceanothus on south-facing, chaparral-covered slope; thicket of live oak in low mat around base of pine; brush of buckwheat, monkey flower, sage, baccharis, and poison oak; and low horehound mats.

A single Bewick wren was recorded on August 9. When the Reserve was visited next, on September 17, the winter population had arrived. At least ten were seen and heard that day.

Long-billed Marsh Wren

Telmatodytes palustris (Wilson)

Long-billed marsh wrens were seen during the fall migration season on November 18, 25, and 26. The birds, numbering fewer than half a dozen, were in the tangles of lupine and sage bushes on the sandy ground close to Point Beach.

The next year, on October 23, one was seen in the dead tangle of plants in the oats patch north of Bassett Avenue. Another was seen at the same place on November 9.

Mockingbird

Mimus polyglottos (Linnæus)

Noted once as a vagrant in the fall; one was seen on the morning of September 22, in ceanothus bushes close to the south end of the fence across the base of Cypress Point. The bird later perched on a fence post and then flew off toward the south. Attention was first directed to the bird by the flash of white on its wings as it moved into the thicket. (See pl. 10 fig. A.)

California Thrasher

Toxostoma redivivum (Gambel)

One of the characteristic birds of Point Lobos is the California thrasher. Although not recorded every day, this bird was present constantly and representatives of the species could be found almost any time by a few minutes' search. The size of the population in winter was estimated on January 5 at six birds. Later work showed that more individuals were present, possibly as many as six pairs.

In this locality the thrasher was restricted to the patches of tall, close-growing bushes. The kinds of plants most frequently inhabited, in order of their usefulness to the species, were ceanothus, baccharis, sage, and lupine. Although these birds were most often seen at the tips of upper branches of the bushes, they spent most of their time on the ground and on twigs close to the ground within the canopy of the thickets. The most suitable foraging situation was the accumulation of leaf litter beneath the ceanothus bushes. Thus the best insurance for the continued presence of the thrashers within the Reserve is the preservation of this litter wherever it occurs and in the manner in which it is now naturally maintained. (See pls. 9-10.)

California thrashers begin to nest early. One seen in the morning of December 12, sang from the top of a fence post surrounded by sage bushes, at the top of the bank of Gibson Creek. Three individuals were seen here, practically together. Two were singing rather brokenly on December 26. On the 30th, three thrashers were in sight at once at the southwest base of Whalers Knoll, in the tops of ceanothus bushes, singing simultaneously, and another in a dead ceanothus giving a repeated, harsh alarm note. On February 20, a thrasher sang twice within a few minutes in the tops of baccharis bushes on the south side of Vierras Knoll.

At the south edge of the top of Whalers Knoll, two thrashers were disturbed late in the morning, and moved swiftly, with low notes of protest, from sage bushes to a clump of ceanothus fifteen feet away. This clump was at least eight feet high and thirty feet across. After digging in the leaf litter for a few minutes one of the thrashers came out on dead twigs in the top of the bush and sang in low tones. It ducked downward when a flicker came close over it, but came back immediately to the perch.

At this same location, on April 16, one thrasher was singing in the top of dead ceanothus and in an adjacent pine tree. A second was in another ceanothus bush fifty feet down-slope, carrying an insect in its bill and uttering notes of alarm. The pair was seen at the same place the next day, one singing and one carrying an insect. Both uttered notes of alarm. Finally, two bob-tailed young, already out of the nest, were seen beneath the canopy of the ceanothus. The nest from which these birds came was found on May 1. It was a little under five feet up, on the east side of the ceanothus bush and about six feet in from the margin of the bush. On May 15, a young thrasher in this vicinity fed within six feet of a watcher beneath a large ceanothus bush. It dug with its bill in many places, and once it ran to a large insect that was thrown to it, but did not pick it up.

On March 23, two thrashers flew up from bushes about half-way down the eastern slope of Vierras Knoll. An old nest of a former season was seen about fifteen feet away. One was seen carrying an insect at this same place on May 19.

A pair of thrashers with bob-tailed young was watched on April 24, in the tall sage and ceanothus near the base of Cypress Point. One of the adults sang and came close to the human intruder and "chucked." Half the time of the bird was spent on the ground and the rest in bushes, below the tops.

A second brood in this vicinity was detected on the evening of June 28. On the bare path between the tracts of dense ceanothus were seen at least two young and one adult, the latter feeding one or another youngster in the open with things gotten in the adjacent chapparal. All were silent. At 7:48 they were still on the path, though it was then very dusky, but there were no feeding activities. One youngster had a bill not yet fully curved, but straightish, and a tail not of full thrasher-length.

On September 19, at 4:30 p.m., five thrashers were in sight at once near the base of the point. One was inside the fence and four were on the ground on the bare area near the ceanothus clump at the west base of Whalers Knoll. These were on an area less than fifty feet across. Some were singing, although some were in molt. Once or twice there was evidence of pursuit among the birds.

Singing thrashers were heard from this time on through the fall. On November 8, three or more were singing and pursuing one another through the ceanothus on the south side of Whalers Knoll.

Robin

Turdus migratorius Linnæus

Robins were observed on the Reserve only five times during the winter. On November 27, a flock of seventeen was flying toward the northeast over the western part of the open ground. In mid-morning on February 20, a male and female were perched in the tops of green lupine bushes close to Gibson Creek. The next morning, early, three robins were found in the tops of flowering ceanothus bushes close to the base of the main point. Late in the afternoon of February 22, three individuals perched along with linnets and Brewer blackbirds in the top of a tall dead pine southeast of Whalers Knoll. Later in the spring, on April 12, between 6 and 6:30 a.m., a robin was singing in the pines near the Warden's House. Possibly representatives of this species nested somewhere in the vicinity of the Reserve, but we have no evidence that it nested within the area.

In the morning of November 5, a single robin was perched in the top of a tall pine on the northern margin of the woods. The next morning one was perched in the top of a pine on Rat Hill.

Hermit Thrush

Hylocichla guttata (Pallas)

In the winter period, from September 19 to March 30, hermit thrushes were present continuously and in sufficient numbers that several individuals were seen on each day in the field. A solitary bird, so inconspicuous as this one and so likely to be overlooked, can not be counted accurately on any sizable area. Point Lobos probably supported fifty or more wintering individuals.

Of the whole area available, hermit thrushes selected for their quarters the portion covered by bushes or trees. They fed mostly on the ground in the shade beneath or between the trees or taller bushes. They frequented

alike the three main kinds of trees, cypresses, pines, and live oaks. Except for a rather obvious predilection for ceanothus, we discovered no marked preference for any particular kinds of bushes. Aside from the possible advantages of a shady situation for foraging, another quality of a suitable habitat was openness allowing for freedom of movement over the ground and rather unrestricted view of the surroundings. This openness needed to extend for only a few inches above the ground, so that some of the densest brush patches from the human point of view may have been just as open for a ground-foraging thrush as an open-floored pine woods. Contrasted with these situations an open meadow where a person could walk freely presented an impenetrable tangle for the hermit thrush in its stratum.

The response of the bird involved its structural manner of movement and of searching for food as well as its sensory response to the appearance of the objects (plants) in the various types of surroundings. The thrushes employed the plants for a purpose entirely independent of the nature of the lowest stratum, to serve as lookout perches whence approaching disturbers were examined and alarm notes uttered. These perches sometimes were at the tips of the plants, in the sunlight, and sometimes on lower branches within shade. When perched on limbs or twigs, individuals were seen more often on bare, leafless ones than within foliage. Perches off the ground were sought usually by birds that had been disturbed. (See pl. 19 fig. B.)

At the season hermit thrushes were present in the Reserve, their activities consisted almost entirely of eating and resting. They paid little attention to one another or to other kinds of birds. A thrush was seen pursuing another on February 24. One was singing on March 25.

Russet-backed Thrush

Hylocichla ustulata (Nuttall)

On May 11 and 17, and June 28, russet-backed thrushes (at least two) were detected in and close to Gibson Creek gulch. Two were singing in the early afternoon of the latter days. These birds probably nested in the vicinity of the southern boundary of the Reserve, but they may have spent a good deal of their time outside the area.

Western Bluebird

Sialia mexicana Swainson

The western bluebird was one of those resident birds noted commonly at Point Lobos, more because of its occurrence, especially in winter, in the more open situations and in groups or flocks than because of great numbers. An estimate made on January 5, of forty individuals in the Reserve, proved to be close to the highest number present on the area at one time. The number of nesting birds was certainly no more than that and it may have been smaller.

Typical forage behavior of bluebirds in this vicinity in winter is indicated by the following review of observations. In mid-afternoon of November 25, a bluebird was perched at the tip of a limb of a dead pine overlooking Mound Meadow. Later, at least four others came to similar perches in the same tree. From these perches the birds flew to the ground, apparently to capture insects, and then returned to the lookouts. Most of their time, however, was spent perched quietly in the weak sunshine. (See pl. 15 fig. B.)

In the morning of November 26, around forty bluebirds were seen in the leafless lupine bushes on the flat southeast of Vierras Knoll. They were perched mostly on the tops of the bushes and close by on the grass. Again on December 25, at the same time of day, about ten individuals at this place were scattered about, perched on the dead, upper twigs of lupine bushes. One close to the observer gave the impression of deeply studying the ground below it, head inclined, attitude intent. A restless drove of fifteen Audubon warblers drifted about, keeping in the general vicinity of the bluebirds which also drifted along, but with far less locomotion and local flitting. Something caused an alarm and all the birds flew up, the bluebirds giving many calls and drifting about a bit, but soon settling in a new place and becoming quiet. Then the cause of the alarm, a house cat, came into view.

Bluebirds in small groups regularly worked over the thinly grass-covered, open ground anywhere on the area. For lookout stations here they chose mostly to perch on the tops of last-year's grindelia flower heads, a foot or less from the ground. In the morning of February 23, several were foraging on the newly harrowed ground at the site of Bassett Avenue, accompanied by Audubon warblers and juncos. Occasionally, a bird flew to perch on a branch of a pine tree near by. One flew down from such a perch, picked up an insect from the grass, and went back to another lookout perch, at the tip of a pine limb on the southeast side of the tree in the sunshine and protected from the cold northwest wind. On the grass-covered slope south of there, several bluebirds were perched on dead stalks of plants about two feet high. One was hunting by hovering, poised on rapidly beating wings, about three feet above the ground, and occasionally going down. On warm days bluebirds frequently flew out into the air to catch flying insects.

During a rain on the morning of April 13, a male perched for part of the time on dead stubs close to, and on the protected north sides of, main trunks of pines. From these perches it flew to the ground occasionally to pick up an insect.

Several times in winter when a sharp-shinned hawk approached a group of bluebirds, the latter flew up with alarm notes and sought safety in the trees. Although at this season bluebirds foraged in company of many species of small birds, they were seen most often with juncos, linnets and Audubon warblers. The warblers trailed nearly every group of bluebirds.

Western bluebirds at this locality spend a remarkably prolonged period in preparation for nesting. Pairs were segregated as early as February 19, although sometimes still associating together in small groups. On the following day several pursuit flights were noticed. On February 22, the birds seemed to show a greater tendency to flock than they had earlier in the week, probably on account of the colder weather obtaining at that time. A month later, on the morning of March 22, a female with a billful of nesting material flew up from the floor of the pine woods and continued for a hundred yards at a high level to a stump at the eastern edge of the woods. There it was building in a cavity ten feet up, on the north side of the stump. The female was seen at this nest on April 8 and both birds on April 27.

From this time on, for the remainder of the nesting season, the birds were seen singly or in pairs scattered through the pine woods and usually close to the dead trunks of pines. Behavior representative of this period was watched in the early afternoon of April 15, in the pines northwest of the Warden's House. The birds of the pair perched on the broken, dead limbs of pines fifteen to twenty-five feet up, averaging twenty feet. From these perches the birds flew to the ground to pick up insects and then usually

moved on to other perches. However, most of their time was spent sitting quietly, as much as five or ten minutes being spent on single perches. They stayed mostly in the shade, but in the western more open part of the grove. This pair was watched for a few minutes daily for several weeks, without once tracing one of them definitely to a nesting cavity, yet it was almost certain that they were nesting all this time. It seemed strange that nesting could be carried on with so little show of it. And this applied as well to all the other pairs.

In all, fifteen nests were found which seemed to be occupied. Some of these required hours of watching before the birds could be traced to them. The locations of some pairs were never discovered. All the nests were in cavities in pines or pine stumps at heights ranging from five to forty feet, averaging twenty-two feet. On the few occasions when material was seen being carried to the nest, the female was doing the work. Usually, however, the male was present and showed an interest in the procedure. Once a male at a nest spent more time there than did the female, going in and out and moving the materials. Several times a male was seen to feed its mate in the manner indicated by the following notes.

On May 2, at 9 a.m., coition was noted twice on a pine snag in the southeastern part of the pine woods. A little more than an hour later the male fed the female. A pair was watched in the same vicinity on May 18. The female entered a nest cavity, and half an hour later, at 11:30 a.m., it left. It returned with the male which fed it a larva on a snag two feet from the nest. The female left; the male left; fifteen minutes later both returned and the male fed the female in a pine thirty feet away; then, at 11:45, the female returned to the nest.

A peculiar feature of bluebird nesting, noted many times, was the almost constant, marked conflict with pigmy nuthatches. These two species seemed to be antagonized by the mere sight of each other. Bluebirds would actively pursue any pigmy nuthatch which came near a stump in which they nested or perched. They even tried to drive nuthatches from small cavities too small for bluebirds. Once a female was seen to hit a nuthatch so hard the feathers flew. The arrival of pigmy nuthatches at any stump close to bluebirds was always a signal for activity on the part of the larger birds. This circumstance may have some connection with the long nesting period and large share of time spent by the bluebirds on perches close to nesting sites. They are continually on the lookout for the nuthatches. Although we saw no clear examples, it seems probable that the bluebirds often drive the nuthatches from cavities they excavate and, where the size of the entrance permits, appropriate them for nests.

Much less animosity was detected among bluebirds toward members of their own species. Two or more pairs were often seen together and peaceable, even during the nesting season. At noon on May 13, two males were seen bathing together in a cement basin near the Warden's House. Later they were joined by a female and all three bathed peaceably.

On May 19, adults were first noted carrying food to young in a nest. Both parents carried insects, which they obtained mostly at the edge of the woods and out in a meadow and carried back through the woods at least one hundred yards to the nest. During the next two days three more nests were found in which young birds were being fed. Usually the female appeared to make more frequent trips than the male.

Blue-gray Gnatcatcher

Polioptila cærulea (Linnæus)

The first blue-gray gnatcatcher found by us at Point Lobos was seen at 3 p.m. on December 10, on the south-facing, ceanothus-poison-oak covered slope at the base of Cypress Point.

Later in the winter at least two individuals were noted repeatedly about Whalers Knoll. At the southwest base of that hill, on December 30, one watched in thick sage flew into the air and caught an insect and then moved to a nearby partly dead ceanothus thicket. Later the bird was seen one hundred yards away, perched eight feet up in a dead ceanothus bush. On February 21 and 22 single gnatcatchers and on February 24 a pair were watched on the southeast slope of Whalers Knoll. At first the last two were in the top of a ceanothus bush in which bush-tits were building a nest. One tarried on the tips of the branches, singing almost continuously as it foraged. Its song close by was suggestive of the whisper song of a thrasher. It was thought that notes of wood pewee and ash-throated flycatcher were distinguishable in it.

The gnatcatchers were foraging by picking insects from the ceanothus flowers, both on short flights and from convenient perches, the latter mostly on leafless twigs. The blue of their plumage was close in tone to that of the ceanothus flower clusters. Half an hour later both birds were back at the ceanothus after foraging off to the northeast in baccharis and sage bushes. They picked insects from the foliage of these bushes. About noon, one was singing and foraging through a sage bush. It kept on the move and constantly peered about over twigs and foliage. Twice it flew out, once as far as ten feet, and caught an insect in the air, one time with an audible click of its bill.

A gnatcatcher was heard on the brushy east side of Whalers Knoll on April 11. As so large a portion of this hill was never examined closely a pair could have nested and been easily overlooked; however, no direct evidence of nesting was obtained.

The following fall, gnatcatchers were noted on the southeast side of Whalers Knoll on October 10, when one was foraging through ceanothus bushes and the top of a tall pine on a west-facing slope; on October 23, one in dead ceanothus; on November 5, one in sage bushes. The next day one was seen in bushes near the eastern margin of the cypresses. Two or three were present on November 8, in the dead ceanothus patch on the south side of Whalers Knoll.

Ruby-crowned Kinglet

Corthylio calendula (Linnæus)

Among the most numerous of the winter visitant birds at Point Lobos was the ruby-crowned kinglet. Numbers fluctuated considerably through the winter, apparently being greatest around the end of November when it was estimated that between seventy-five and one hundred were present. An estimate based on counts made about the first of the year placed the number at forty-four. The number of individuals seen during the spring decreased markedly after March. One was recorded each day on April 11, 14, 16 and 18. The first one in the fall was noted on September 20.

Kinglets occurred most frequently as members of the flocks of small birds which foraged through the pine and cypress trees and the taller shrubs, especially ceanothus. Thus they covered the whole area except the open

grassland. Variety of forage places of wintering kinglets is indicated by the following notes recorded on the afternoon of November 25.

About noon one was foraging among dead branches of a pine at the margin of the woods. Two hours later several were seen in a flock of small birds feeding among pines, but they were moving singly. One moved along a fallen, dead, lichen-covered pine and the ground adjacent to it, feeding in the shade. At 3 p.m. a congregation of around forty kinglets was found foraging in a small area of young pines close to a road through the woods. They were mostly in the tops of the trees. The next morning fifteen or more kinglets were foraging through cypresses and pines at the southeast base of Big Dome. During March and April foraging kinglets were seen often in the foliage of pines, live oaks, and ceanothus which was then in flower.

Singing kinglets were recorded frequently in spring between February 23 and April 18. Usually, however, presence of this species was indicated by the location notes given regularly, or by the occasional series of alarm notes.

Pipit

Anthus spinoletta (Linnæus)

Several flocks of pipits were present on December 31. These were observed in flight and foraging on the open grassy slopes close to the north boundary fence of the Reserve. In two flocks, seven and sixteen individuals were counted.

Loggerhead Shrike

Lanius ludovicianus Linnæus

Four or five shrikes were stationed in various parts of Point Lobos for a part of the winter (first recorded on September 17) and, possibly, other individuals visited the area during their wanderings. Because it was easier to identify the ground occupied by the species than the individual birds concerned, the following account of behavior and habitat is based on the places where shrikes were seen.

Toward the southern end of the Reserve, in a pine between the road and the shore west of Vierras Knoll, a shrike was seen on November 27. On the 30th, in mid-afternoon, a shrike was noted about eighteen feet up in the tip of a dead pine on more or less open ground near and northwest of Vierras Knoll. It was facing inland from the sea. East of this hill, on December 25, a shrike was perched on a lupine bush, and on March 28 another was in this vicinity.

At Mound Meadow in the afternoon of November 25, when a shrike flew to the dead tip of a pine at the margin between the woods and the meadow, some small birds in the meadow flew toward cover with alarm notes. About three minutes later, the shrike was seen pursuing a small bird which sought refuge in a tangle of dead limbs. Fifteen minutes after this, a shrike was perched in the top of a living pine at the margin of this meadow. Twice, it went to the ground, about fifty feet from the perch, as if food had been sighted, but the result of the flights could not be determined. The next day one was on a bush in the center of the meadow. At this meadow, just before noon on January 2, a shrike was perched on a sage bush on the sea side of the road near the shore. It flew to a perch on the highest rock at the brink of the sea bluff.

Between the western edge of the pine woods and the base of the Point a shrike was observed several times. On the morning of November 25, one perched on a wire and on posts at the base of the point. In the afternoon one came to a perch on a lower limb of a marginal pine. On December 26, a shrike was seen to fly to the ground from a perch on an outer branch of a pine at the southwest base of Whalers Knoll. From there it flew off low over the open ground. Later, one was perched on the top of a dead cypress on the sea bluff almost over the surf on the south side of the base of the main point. On the morning of February 21, a shrike was perched in the top of a dead bush, six feet up, east of Point Beach. After ten minutes it flew to the top of a picnic table near shore, making a stop on the ground on the way, and after fifteen minutes on the table, returned to the bush.

On the afternoon of November 26, a shrike was watched on a dead limb of one of the line of pines which extended northward across the road from the main woods. It drove away a yellow-billed magpie which came near, giving a threatening note as it pursued the larger bird. A shrike was perched in an upper, outer branch of a dead pine in this group on November 29; and again, on December 28, one came to this tree and caused alarm among some juncos perched near there. A shrike was posted on weed tops along Bassett Avenue on the afternoon of December 31.

Near mid-day on December 11, a shrike was watched as it moved from perch to perch on a power line east of Carmel Cove. It kept close to the poles, rather than far out on the wires between them.

The situations mentioned above agree in that the birds perched on objects from which they could survey a more or less wide expanse of open ground, apparently for the purpose of watching for movements of small terrestrial animals which they might capture. On November 4 one was seen to fly twenty-five yards to pick up an insect from the ground. Here the birds were seen always solitarily. There was no way to tell how long each individual remained at any one location. It is possible that none remained for longer than a few days, or even a few hours.

Hutton Vireo

Vireo huttoni Cassin

The Hutton vireo was a resident species at Point Lobos, so inconspicuous in manner and so small in numbers as to be easily overlooked. Not more than ten pairs nested within the area. The pairs each ranged over such a large district and came so near one another that it was impossible to determine numbers exactly without some method of marking the individuals. Another disturbing factor in making counts was the uncertainty about what happened to pairs whose first nesting was unsuccessful. There was no way to tell whether they rebuilt in the same vicinity or moved to some new location.

In winter the vireos joined the wandering flocks of miscellaneous small birds which foraged all through the trees and tall bushes everywhere in the Reserve. Several times in November and December one was seen with chickadees on Cypress Point, in the lower, dead, lichen-hung under branches of cypresses. Other times, as on February 19, individuals were found among the live oaks and pines. At noon on that date two were in the trees south of the Warden's House, one singing and the other answering from across the highway one hundred yards away. They kept within twenty feet of the ground, in the terminal green and dead twigs. Bush-tits and

ruby-crowned kinglets foraged near there. The next day one was feeding in the upper foliage of tall pines close to the house.

In the afternoon of February 23, just within the edge of the woods north of Vierras Knoll, was a persistently singing Hutton vireo, alone as far as could be seen, and moving through the tops of live oaks and pines. Its note was of a uniform kind in any one series, but there was variation from series to series. Seventy-six notes were counted in one series in exactly one minute, forty-nine in another.

The first nest of this species was found on March 20, when a pair was carrying material to a site seven feet up in the end of a limb on the southeast side of a twenty-foot pine in a clump of trees of that size and of many fifty-foot ones, at the north base of the hill between Mound Meadow and Little Mound Meadow. An incubating bird was seen on this nest on April 8 and it held three eggs on April 14. Ten days later this nest was found on the ground beneath the site. Apparently it had been blown from an insecure attachment by a strong wind.

The second nest, found on March 21, was in such an early stage of construction that the material comprising it could not be distinguished from pieces of lichen on the same branch. It was on the east side of the small hill southeast of Whalers Knoll. The site was six and one-half feet up, in the end of a bough of ceanothus and on the east side of the clump. By March 23, much more material had been added, but it still was without the shape of a nest. The next day it was definitely shaped. When this nest was visited on April 8, it was found half upset and about six inches below its former site. One whole egg was still in the nest, two on the ground, and the shell of one nearby. It could not be determined whether the nest had been torn out by wind or by some animal such as a house cat.

A third nest also barely started was discovered on the afternoon of March 24. This one was seven feet up, near the end of a branch of a small pine fifteen feet high in a circular thicket of young trees, fifty yards north of the edge of Mound Meadow, and surrounded by tall trees. The nest was on the west side of the tree and on the inner side of the circle. It evidently had been begun that day, for the materials so far gathered could not be found when the site was examined after the birds had gone there half a dozen or more times in fifteen minutes. Both of the birds carried material, but one paid more attention to placing it and weaving the rim than the other. The lichens they used were gathered from young pines close to the site and from the tops of tall pines. Once, one of the birds remained quiet for nearly five minutes, perched in the center of a small pine adjacent to the nest tree. Both birds were quiet most of the time. An incubating bird here on April 8 was not disturbed. There were four eggs on the 14th. The bird then did not leave until almost touched. On the morning of April 26, the parents were feeding young that had just hatched. The young birds were still in the nest on May 12, but it was empty on May 14.

A young vireo barely able to fly was being fed by its parents on April 25, in live oaks near the southeast corner of the pines.

On May 13, on the slope southwest of Blue Fish Cove, a nest was found four feet up, in a horizontal fork of a twig four feet from a main branch of a lower limb of a large ceanothus which grew among tall pines. Both parents were actively feeding large young in the nest. Apparently three birds made up this brood.

Two separate pairs were watched carrying material for nests that were not found. One on April 17, was in the ceanothus and chaparral west of

Little Mound Meadow; the other, on May 21, was in the large pines along the north margin of the woods.

Orange-crowned Warbler

Vermivora celata (Say)

Orange-crowned warblers, numbering up to six individuals, were found on eight days from November 27 to April 16. In the fall, on November 27, one was foraging in a tangle of tall dead ceanothus and leafless poison oak on the north side of Vierras Knoll. On December 10, two were seen in separate clumps of ceanothus on the south-facing slope north of Point Beach. Birds seen on March 22, 23, and 28, and April 16, were in chaparral, dead and blossoming ceanothus, sage brush, and baccharis, west of Little Mound Meadow and south of Whalers Knoll. Small groups of this warbler, obviously transients, on March 23, and April 11 and 12, were foraging through live oaks among the pines.

Single individuals were seen in the second fall on September 19, October 8 and 10, and November 8.

Two subspecies were probably represented, the Lutescent Orange-crowned Warbler (*Vermivora celata lutescens*) at migration time, and the Eastern Orange-crowned Warbler (*Vermivora celata celata*) in the winter season.

Yellow Warbler

Dendroica æstiva (Gmelin)

A singing male yellow warbler, at 10 a.m. on May 21, was foraging through the tops of pines close to the northwest corner of the woods.

Audubon Warbler

Dendroica auduboni (Townsend)

Audubon warblers were seen in the Reserve practically every day that observations were made from October 7 to April 28. This was by far the most numerous of the strictly winter visitant land birds, and it was equaled or exceeded in numbers by only a few kinds of year-round residents. An estimate of numbers on January 5 was eighty-five, but there was obviously much change in the population so that several hundred individuals must have visited the area during the year. Some of the larger counts of single flocks were of twenty-five on November 18 and 26, forty on December 22, twenty-four on December 30, twenty-five on February 22.

It was observed on December 30, that of all the birds in the area, this species came the nearest to penetrating all types of habitat, from the tide-exposed littoral reefs and open grassland to the tops of the tallest pines. Perhaps this wide adaptability accounts for its large numbers and its "hardihood" under winter conditions. There was a marked seasonal contrast in the forage habits and habitats of Audubon warblers as between early winter and spring. It was in the fall and winter that the warblers went outside the places where such a bird might be expected to occur. The types of forage beat resorted to at this season may be shown by the following examples.

Individuals or groups were found foraging: on lower limb of cypress; in grass-covered clearing in pines; into grassy meadow from margin of pine woods by way of recently accumulated brush pile; on the ground, by flights from a nearby dead pine; into the air from a dead pine; in leafless lupine

bushes on grassy flat ground; over dead, fallen cypress; along drift on sandy beach; on newly harrowed strip of old roadway; on ground and in herbaceous plants, grass and small bushes; through the tree tops, some birds as low as twenty feet from the ground; on face of sea cliff, flycatching; around and over outer, exposed rocks along the shore where entirely covered at high tide, flycatching; about shelves of flattened cypress crowns, with much looping out to catch insects; in small sage bushes with intervening tracts of grass and new herbage; far out over rocks at tip of point; at parking place, on bare ground and on adjacent grass toward water trough; on slope where old dead ceanothus is interspersed with scattering pines; along a fence; over tide pools; in two little pines along brushy ravine at garbage dump; in sunlit top of outermost pine tree; at edge of lupine bushes; scattered through eriogonum on south-facing slope; on beach where sheltered and sunny, down to very edge of surf, alighting not only on some drift, but on the bare sand; around stranded kelp on beach and then flattened ceanothus thickets, working over thinly grassed open ground; through pines at edge of meadow.

At this time of year Audubon warblers were often observed foraging on open ground in company of some other species. Among these were juncos, linnets, and western bluebirds. The association with this last larger species was the most constant, as it was observed repeatedly. The droves of warblers seemed to drift about, keeping in the general vicinity of bluebirds, which also drifted along but with far less locomotion and local flitting. Often when a single bluebird took flight, three or more warblers would start up and follow it.

In the spring, through March and April, the Audubon warblers were noted regularly feeding in the foliage of pines, live oaks, and ceanothus. They rarely went to the ground, but often flew out into the air after insects. The last individual recorded in spring was one singing in a pine at the margin of the woods.

Black-throated Gray Warbler

Dendroica nigrescens (Townsend)

The black-throated gray warbler was noted once, at 3 p.m. on April 26, when one perched momentarily in a dead ceanothus bush on the hill southeast of Whalers Knoll.

Townsend Warbler

Dendroica townsendi (Townsend)

Townsend warblers were detected on twenty-two days between September 17 and March 30. Usually not more than six individuals were seen in one day. An estimate on January 5 placed the number in the Reserve at that time at eighteen.

Most of the wintering Townsend warblers foraged in company of other small birds, especially chickadees. They were noted in both pines and cypresses, but seemed to be in the cypresses more often than any other bird species. Many times one or more were seen in the dense foliage of a cypress, frequently on the tops of flattened lower limbs, but sometimes out on the tops in the sunshine. One was watched for twenty minutes on the morning of March 19, as it foraged in the crown of a cypress, chiefly beneath the main mass of the foliage, but sometimes out on top in the sunshine for a few seconds. Occasionally a bird would "loop" out to catch a flying insect. (See pl. 20.)

In the pines this warbler foraged at all heights, usually moving over the small branches near the top of the tree or among the needles at the end of a limb. Small trees as well as large ones were searched over. Several watched on December 1, among pines, were actively flycatching in the sunshine. One lit momentarily on needle-strewn ground.

Songs of Townsend warblers were heard several times in spring between February 20 and March 23.

Hermit Warbler

Dendroica occidentalis (Townsend)

A hermit warbler was definitely distinguished at 9 a.m. on November 27, foraging with a flock of chickadees in a pine surrounded by cypresses north of Whalers Knoll. This bird part of the time was within ten feet of a Townsend warbler.

Tolmie Warbler

Oporornis tolmiei (Townsend)

Observed once, on April 25, when a male was seen in the margin of a low thicket at the edge of a pure stand of poison oak at the north base of Whalers Knoll.

Yellow-throat

Geothlypis trichas (Linnæus)

In the early afternoon of March 21 a male yellow-throat was seen and heard singing in bushes of sage and baccharis at the south base of Whalers Knoll. On September 22, another male was seen in low bushes close to the south end of the fence across the base of the Point. A female was seen there on October 8.

Pileolated Warbler

Wilsonia pusilla (Wilson)

Approximately fifteen pairs of pileolated warblers nested within the Reserve. The first individual noted in spring, on March 28, was singing in the lower part of a ceanothus thicket on the north side of Vierras Knoll.

Birds located for nesting were scattered in the following kinds of places. On the steep, east-facing slope of Whalers Knoll, among ferns in the shade, several individuals were seen on the afternoon of April 16. Along the eastern edge of the pines, on the north and south sides of Rat Hill, and at other places where there were live oaks and low thickets of bushes beneath the trees, there were many pairs. The shaded north side of Vierras Knoll proved suitable for this warbler. At least two pairs had quarters on the wall of the gulch of Gibson Creek at the southern boundary of the Reserve.

The nesting niche of this bird came close to that of juncos at several places. Two warblers in bushes at the north base of Rat Hill, on April 18, were pursued persistently by a junco.

For half an hour, beginning at 9 a.m. on May 2, a female watched close to the highway in the southern part of the pines had several spells of carrying nesting material, mostly leaves, to a spot in a blackberry and poison oak thicket, ten feet from the base of a large pine. The general site was a low tangle near the bottom of a shallow "draw." The bird usually went less than ten feet away for the material and hurried back

to the nest. After about twenty-five such trips it would make a longer trip off through the woods to forage. A male was singing near-by. On May 12 the nest contained four fresh eggs. Its rim was 345 mm. above the ground, the nest resting in leaves and twigs of blackberry and poison oak, with lodged pine needles and dead blackberry leaves immediately underneath.

A second nest was discovered on May 19, four feet from the base of a dead, lichen-covered ceanothus on the north side of Rat Hill. It was surrounded by herbaceous plants about eight inches high, mixed with poison oak, ferns, and blackberry. The nest was built largely of pine needles and was mainly above the ground level, in a site shaded by pine trees. The four young birds in the nest were nearly full-feathered. Both parents were carrying food and they showed much concern at being disturbed. The male especially showed nervousness.

A male was heard singing as late as June 28; and on August 10, one was seen foraging close to the Warden's House.

English Sparrow

Passer domesticus (Linnæus)

English sparrows apparently were established at the farm buildings across the road from the Reserve. A male, evidently from this colony, was seen perched on a fence post on the north boundary on the afternoon of May 13.

On July 1, in a pine near Bassett Avenue, there were two youngsters, bob-tailed and yellow-billed, constantly giving food calls; and on a bending oat head near-by was an old male gathering ripe oats to soak up and feed to them.

Western Meadowlark

Sturnella neglecta Audubon

In the open portions of Point Lobos the western meadowlark was the most numerous kind of bird and the most persistently conspicuous one throughout the whole year. Repeated counts and estimates fixed the highest number present at one time, in winter, as around two hundred. The meadowlarks in winter were banded into two or three flocks varying from forty to one hundred individuals, with additional scattered individuals always present in the neighborhood. With the approach of the nesting season the visual hindrances to accurate determination of numbers of this bird increased. There seemed to be a decrease in numbers about this time. Possibly not more than fifty pairs remained to nest.

Although the meadowlark at Point Lobos was obviously a bird of the grassland, it was not evenly distributed within that habitat. It foraged where there was a rather dense cover of plants, but where also these formed a low mat. Also the bird favored surroundings where elevated perching places were available. The following kinds of places where flocks were watched in winter indicate the responses of this bird to the habitat available here.

November 26: compact flock of about one hundred moving over grassland south of Carmel Cove in afternoon. Just before dark these birds flew to the gully below the garbage dump and settled there as if they intended to stay for the night. December 14: in the rain, at 11 a.m., several were standing on the ground beneath an isolated pine tree. February 24: several about a pine near highway east of Vierras Knoll; some in top of the tree,

some on wires on telephone line, some on tops of bushes, mostly singing and all in sunshine. March 23: small group in grassy area west of pines, mainly close to bushes; a few singing from tops of scattered pines near the shore northwest of Vierras Knoll. March 24: flock feeding with Brewer blackbirds west of Whalers Knoll in early afternoon; two at 2 p.m., bathing in a puddle in a wheel track; others scattered over open ground.

The power lines extending across a part of the grassland at Point Lobos constitute a slight hazard for meadowlarks, as was demonstrated on the afternoon of October 21. A dead bird was found on its back in the roadway close to this line. Evidently it had been killed by hitting the wire, for aside from a trace of blood at its mouth there was no external sign of injury.

Another possible source of danger to the birds was indicated in the autumn, when on several occasions foraging marsh hawks flying close to the ground south of Carmel Cove disturbed flocks of meadowlarks which hurriedly flew away. However, no hawk was seen actually to pursue a meadowlark.

Meadowlarks were heard singing throughout the year, so this activity could scarcely be considered as indicating the approach of the nesting season in the spring. However, behavior of possible significance in this direction was noted on the afternoon of April 9. A meadowlark pursued another several times; both lit on the ground after each pursuit. Finally one left and the other returned to the top of a bush and sang. Interspecific tolerance was indicated on April 11, when a singing meadowlark was perched along with two male red-winged blackbirds on a saw horse at the edge of an oats patch.

When nesting started, the meadowlarks became so secretive and the cover of vegetation had become so dense that it was difficult to find their nests or to keep track of their progress in nesting. On April 24, a nest was found in the grass about one hundred feet north of the pines and the same distance west of the garbage dump. The site was close to a small blackberry plant. The nest had been broken up by some animal; it contained the shell of at least one egg, and a whole egg lay outside on the grass.

Two days later, a second nest was discovered on a slight east-facing slope fifty yards from trees southeast of Whalers Knoll. It, too, had been dug out and the eggs eaten. On the ground were the crushed shells of at least three eggs, along with the mat of fine grass stems which had lined the cavity.

On May 13 an occupied nest was found between two mounds near the south edge of Mound Meadow. It opened toward the north and contained five large young which showed remnants of the pale down and whose feathers were nearly ready to break their sheaths. These youngsters were almost fully feathered on May 16. They had left the nest by May 19. The locations of at least three other nests were determined approximately, but we were unable to find them. The adults were watched as they carried food to these spots and they were flushed from there repeatedly, but concentrated search revealed no nest.

Red-winged Blackbird

Agelaius phœniceus (Linnæus)

A colony of red-winged blackbirds was present at Point Lobos during the nesting season. Although only eighteen nests were found, it seemed

certain that at least forty females nested. Almost as many males were present.

On the morning of March 22, the first red-wing was detected when a male was seen and heard several times along with Brewer blackbirds in the oldest grassland north of the pines. On March 29, a mixed flock of about forty birds of these two species was foraging in the green grass to the north of the site of Bassett Avenue. Fully fifteen of these were brilliant male red-wings. When closely pressed, they all flew up into scattered pines and the red-wings indulged in a loud chorus of song. Their interest, even then, seemed to be in the heavy growth of mustard toward Carmel Cove. (See pl. 6 fig. A.)

Twenty or more individuals were perched on mustard and oat plants in the area south of Carmel Cove on April 10. Many pursuits of females by males were noted. A male and a singing meadowlark perched on a saw horse at the same time and paid no attention to each other. A large portion of the pods of the mustard had been opened and the seeds eaten, doubtless here by the blackbirds.

RECORD OF NESTS OF RED-WINGED BLACKBIRD FOUND AT POINT LOBOS

No.	DATE	LOCATION	HEIGHT ABOVE GROUND	STAGE	COMMENT
1	Apr. 12	grass and mustard	2 ft.	half completed	2 eggs on April 17, 5 on April 26
2	Apr. 12	mustard and oats	2 ft.	half completed	
3	Apr. 17	thistle	1 ft.	2 eggs	4 eggs on April 26, 5 on May 12
4	Apr. 17	radish	2 ft.	5 eggs	
5	Apr. 17	radish	2 ft.	new, empty	5 eggs on April 25
6	Apr. 25	mustard	2½ ft.	5 eggs	
7	Apr. 25	composite	15 in.	5 eggs	
8	Apr. 25	radish	3 ft.	1 broken egg	
9	Apr. 25	oats and mustard	2 ft.	new, empty	
10	Apr. 26	oats	18 in.	4 eggs	
11	Apr. 27	lupine	18 in.	5 eggs	
12	May 11	mustard	15 in.	5 large young	
13	May 11	grass and mustard	2 ft.	2 eggs	
14	May 12	oats	7 in.	4 young	
15	May 1	oats		3 young	
16	May 16	radish	18 in.	4 eggs	
17	May 16	dock	15 in.	3 young	
18	May 16	grass	1 ft.	3 young	

The following evening, between 5:30 and 6 o'clock, this colony was watched. Both the males and the females were eating seeds of mustard and radish and once a male was seen eating ripening heads of oats. Several times, linnets were chased away, apparently from the food supply. Many pursuits of females by males were seen, but the females persisted in staying. Females were posturing repeatedly; copulation was noted three times. Once a male left one female and flew directly to another. It mounted each. Two fighting males flew nearly twenty feet into the air, clawing at each other, and then went back to the ground where the outcome of the conflict could not be seen. The blackbirds uttered alarm notes when a red-tailed hawk flew close overhead.

The red-wing colony occupied nearly all of that portion of the Reserve that had been planted to oats in 1934. The volunteer growth of that plant

along with the mustard and other tall plants provided satisfactory living quarters for red-wings during the breeding season. Details of time, position, and contents of the nests found are easily seen in the tabulation on page 115. There was marked similarity in all these factors.

At least two broods of young red-wings, all bob-tailed but able to fly, were seen out of nests on May 16.

All through the nesting season the males were much more concerned at being disturbed than the females. They came close and protested loudly each time a person came near the nests. One male in particular would follow an intruder for about two hundred yards, repeatedly striking the person on the head with its feet and bill.

When the Reserve was visited again for a few days beginning on June 19, only a few red-wings were seen. Apparently they left the area as soon as the young were able to fly. A male was perched on the north boundary fence on June 22. On July 1 a female was seen near here to go down out of sight in the tall oats with bugs in her bill; and soon two young were routed out, which circled on unsteady wings, then to perch, clinging on yielding oat stems, to the great consternation of the mother. No male was seen at this time.

Bullock Oriole

Icterus bullockii (Swainson)

Bullock orioles were noted as occasional transients in the spring. On March 29, three males keeping low beneath cover in the tract of pines on the north-facing slope at the head of Blue Fish Cove, seemed much out of place. On April 12, 18, and 25, single birds were seen and heard in the tops of tall pines along the north edge of the pine woods.

Brewer Blackbird

Euphagus cyanocephalus (Wagler)

Brewer blackbirds were prominent among the bird residents of Point Lobos for at least half the year, from mid-winter to mid-summer. Within that period the number varied considerably, but most of the time it was around one hundred or perhaps one hundred and fifty. Occurrence in flocks, and during the nesting season in small colonies, helped to make this one of the conspicuous birds in the Reserve.

On the afternoon of November 27, a flock of Brewer blackbirds was seen at a water trough in a pasture just north of the Reserve. The first ones within the Reserve were noted on December 11. Just after daylight one was flushed from the grassy slope north of the Warden's House. Later, two groups of four birds each were flying toward the north, evidently from roosting places in the main grove of pines. At 9 a.m., a flock was seen on the grassland in the northeast corner of the Reserve. In the evening a flock was flying toward the south.

Through February and March small flocks (up to 75 birds in one) were observed regularly foraging on open parts of the Reserve. They visited grassy areas everywhere, but especially those close to the picnic tables near the south shore and others where the vegetation was short. Sometimes the birds sought shade beneath the tables, and often perched on the tops of them. The strip of ground at Bassett Avenue which was plowed and harrowed late in February was for a few days much frequented as a foraging ground. For resting places between periods of feeding the blackbirds flew to the

tops of pine trees. Small groups in late afternoon often perched in the tops of dead trees in weak sunshine. Refuge from disturbance was sought in the trees. Along the shore, blackbirds foraged at drift on the sand and over the vertical rocky cliffs.

On the ground these birds were sometimes in the company of western bluebirds and red-winged blackbirds. In the trees they perched close to bluebirds and linnets. On February 22, three Brewer blackbirds took to flight in startled manner just before a sharp-shinned hawk arrived at that spot. On March 28, a sparrow hawk alighted in a dead pine in near company of Brewer blackbirds without alarming them in the least. Later, in the nesting season, on May 11 and 19, male blackbirds flew after sparrow hawks which came near them in the same vicinity. The approach of a pigeon hawk on April 10, caused blackbirds here to utter alarm notes and fly to the trees.

On several evenings during March and early April, blackbirds were watched as they congregated to roost in the tops of the tall pines at the western margin of the woods. The birds would fly up in small groups and alight on the flat tops of the trees and then settle down within the ends of the boughs.

Although singing males had been observed several weeks previously, definite evidence of the approach of the nesting season was noted on April 9 when the birds seen were apparently paired but still in flocks. The next day, twenty-five or more were seen in the group of pines on the shore close to China Cove. They were mainly assorted by pairs, the male of each pair following the female. Once a male pursued another male, and once a male pursued a female for a minute or more. Three females were seen carrying materials to boughs on the east side of the group of trees. One nest that was visited three times was fifteen feet up in the end of a bough. The birds in this colony were watched on April 13, at first (9 a.m.) in a light rain, foraging on bare and thinly plant-covered ground, where food objects could be picked up from the earth surface. Later, when the rain was harder, the birds foraged beneath the trees and then perched among the foliage. No nest-building was engaged in during the rain. Adults were carrying food to young in nests here on May 15.

Other groups nested in marginal pines at the west end of the woods and in the line of trees which extended northward from the woods. Most of the eleven nests definitely located were at the ends of branches of pine from eight to thirty-five feet above the ground. Nearly all of them were well concealed in clumps of pine needles. Several incidents showed various stages in the nesting cycle. On April 24, when a male red-winged blackbird lit near a pair of Brewer blackbirds on the ground, it was chased away by the male of the latter pair. (See pl. 14.)

On April 29, at 1:45 p.m., a female at one of the nesting colonies postured. Two males came in response, one of them mounted and both then left. At 9:40 a.m. on April 30, a female postured and called near some nests. Immediately, three males came, but the first one drove away the other two, and then returned and mounted.

Apparently nearly all these blackbirds left the Reserve as soon as the young had left the nest; for on June 20, search at the sites of the three main colonies showed no birds at one, only two at another, and fewer than twelve at the third. These seemed to be still carrying food to nestlings. A single Brewer blackbird was seen on June 28, flying high overhead near China Cove. Two were seen along the beach by Mound Meadow on July 1.

Blackbirds were seen next in the Reserve on October 8. From that date on through October and early November, small numbers were seen daily on the area that had been burned on September 26. A flock seen there on October 10, flew high in the air when a sharp-shinned hawk flew over and circled. Several blackbirds dived at the hawk. When not actually foraging on this cleared ground, the birds perched in near-by pines. At 4:30 p.m. on November 7, a flock of thirty or more was seen in the top of a dead pine at the gap by Blue Fish Cove.

Lazuli Bunting

Passerina amœna (Say)

On May 2, a lazuli bunting was singing late in the morning in some bushes near the northeastern corner of Mound Meadow.

Purple Finch

Carpodacus purpureus (Gmelin)

Beginning in early January, purple finches were seen on most of the days when observations were made, but in such small numbers contrasted with linnets that it was easy to overlook the former species. Usually only two would be seen at a time and six was the largest number seen in any one day. There may have been as many as ten pairs in the whole Reserve.

In winter, purple finches were seen in the patches of radish, biting to pieces the pithy dry pods for the seeds. On January 3 there was a profuse crop of these, some ripe and others still green, and the ground was strewn with débris where the birds had been shelling out the seed.

On March 30, four purple finches were found in a sheltered opening in the pines next to the highway where there were several oaks. They were feeding on the new growth of the oaks—then blossoming. Later in the spring, this bird was noted several times during April and May, in ceanothus bushes busily eating the sticky, green tri-cornered fruits of that plant. A male, watched on May 17, was feeding from the newly ripened seed heads of grasses in the southeast corner of the Reserve.

The songs of purple finches were heard many times at various places in the pines, mainly south of Rat Hill, just north of Mound Meadow, and on the hill southeast of Whalers Knoll.

On the morning of June 28, seven or more purple finches, mostly young, were seen down in the heavy brush at Gibson Creek. The food calls of the young were then heard almost constantly.

Linnet

Carpodacus mexicanus (Müller)

Linnets were present at Point Lobos throughout the year but in varying numbers. The population was greatest during the early part of the nesting season, when this was the most numerous species with the possible exception of the colonial cliff swallow. It was estimated that at the middle of May at least eight hundred individuals were living on the area. Fifty occupied nests were recorded and several more were seen which seemed to be occupied.

A low point in numbers of linnets in the Reserve came at the beginning of our observations, in November and December. At that time individuals and flocks were present, but this was far from being a conspicuous species.

An estimate made on January 5 placed the total number at fifty and these were mostly in one or two flocks.

Ordinarily linnets exhibited a marked preference for open places, exposed to the sunshine. Flocks were observed in winter in the dead tops of pines at the margin of the woods, on wires of telephone and power lines, in live oaks, in the dead and leafless cypresses and also in the live ones, on the ground where the cover of vegetation was sparse, in the tops of brush piles, and in extensive patches of mustard and radish. Some of these places were occupied as forage sites, but others served only as safety refuges or as perches where, seemingly, sunshine could be absorbed.

Several linnets feeding on the ground on February 20, in the western part of the main open area, were in company of Audubon warblers and western bluebirds. Between 9 and 11 a.m. on April 13, during a rain, a colony of linnets was watched foraging on the ground near a group of pines at China Cove. Several times, flocks of fifty or more birds were feeding together in compact groups on ground where it was partly bare and partly covered with a low mat of vegetation, the plants being mostly under two inches high. Here they fed on the ripening seeds and possibly other parts of the plants. All the food was picked from the upper ends of stems. Often the birds were seen to hull and discard outer coverings of the seeds. Each bird moved about indiscriminately, so that the organization of the flock changed continually. However, the majority of a given group would move at one time to the trees, and then back. When the ground was covered with these feeding birds, there seemed to be as many more in the trees, singing and moving about from limb to limb. When feeding, the linnets paid little attention to one another—sometimes one moved a little at the close approach of another.

On another rainy day, April 14, several linnets were working over the piles of wood at the main woodpile.

Ten linnets were watched at close range on January 3, in the radish patch north of the Warden's House. They were biting to pieces the pithy, dry pods of the radish for the seeds. There was a profuse crop, both ripe and still green, and the ground was strewn with débris where the birds had been shelling out the seed. Approximately fifty birds on the morning of February 23 were watched in this radish patch and in the adjacent scattered pines along Bassett Avenue. They spent most of the time in the crowns of the pines chattering or singing, but occasionally groups or individuals would fly down to the radish plants. Apparently their interest centered in the last year's plants, for they usually went down out of sight below the new growth. This impression was modified slightly when the plants were examined later and many scattered linnets that had been feeding silently flew up from places where they had torn open and removed seeds from fresh pods; but the older and more nearly ripe ones on the lower parts of the plants seemed to be preferred. Many linnets that were feeding on mustard and radish seeds near some red-winged blackbirds, on April 11, were repeatedly chased away by the latter. (See pl. 6 fig. A, pl. 12 fig. B.)

Our visits to the Reserve in early spring were too infrequent to trace in detail the first stages of the development of the breeding cycle. On March 20 a pair was watched in which the male was actively displaying close to the female, turning back and forth with spread tail and drooping wings, and singing. The first nest found, apparently a new one, was seen on March 21, out of reach up in a cypress. It was noticed on March 22, after several days of cold weather, that not so many linnets were singing

as usual. This was just about the last species of bird to be quieted by the cold and (or) the overcast sky. The following day this was one of the most conspicuous singing birds.

A prominent habit of mated pairs of linnets is the feeding of the female by the male. This was observed on March 28 when a male was seen to feed a female perched in a dense branch of living cypress, making four trips altogether. Another time, on April 14, a male was seen feeding a female. On April 23 a male fed a female which quivered its wings and chattered loudly in the top of a dead cypress.

The respective parts played by the two sexes in nest building are indicated in the following observations. On April 11 a male and female were foraging together on bare ground close to an isolated pine tree. Then the male picked up several straws and flew with them to one of the lower limbs of the tree. It acted as if it were placing them on a limb, and then it carried them to another perch where it dropped them. Next, both these birds flew away. At nest 3, on April 12, the female was carrying materials gathered from the tree which held the nest and from neighboring trees. The nest was constructed mainly of lichens. On the same day, at least four other females and a male were seen carrying nesting material, but each flew out of sight among the pines. They were building mostly on the slope facing the south, close to Mound Meadow. Often half a dozen or more were seen in the same tree, hence it was hard to keep track of individuals. Some birds were gathering lichens; others were breaking off dead stems from monkey flower bushes. Two did this at the same time and only fifteen feet apart.

The usual procedure seemed to be for the female to gather and carry to the nest most of the materials and for the male to accompany her and sing. On the morning of April 30, the male, of the pair at nest 31 which was in a cavity near the top of a pine stump, spent much time in the cavity. It repeatedly entered, looked out, and flew out about a foot and directly back. The female on a nearby snag showed concern for the watcher's presence, although it finally went into the hole. Then both birds left. At nest 32, on May 1, both birds were carrying material, mostly lichens pulled from the limbs of the same tree, to a site beneath a heavy accumulation of pine needles on a dead snag. The male, however, sometimes stayed close to the nest and sang. Often the object being carried to this nest was dropped as the birds entered the cranny. On May 18, at nest 46 the female was carrying material, closely accompanied by the male. The latter came once with its bill full of lichens which, however, it carried away again.

One nest found was on a vertical cliff along the shore, one was beneath the eaves of a building, and several were in cavities and crannies in stumps and even in living trees; but the majority of the fifty recorded were on the limbs of trees. Both pines and cypresses were occupied, with a slight tendency to favor the latter. As to distance above the ground, the nests examined ranged from five to forty-five feet, averaging eleven feet. This average may be a little lower than the true average, for a good many nests at higher levels and which were obviously occupied were not included in the records. As already intimated these nests generally were well concealed among lichens or masses of trash on tops of flat limbs or boughs. The degree of concealment was higher because the nest materials were the same in kind as provided screen.

Contents of eighteen nests were as follows: Four nests held three eggs, five had four, eight had five, and one had six. Sets of three may have been

incomplete. The first complete set (5 eggs in nest 9) was found on April 23.

Nest 6, on the end of a low limb on the east side of a pine, was well started on April 16. At 1 p.m. on April 23 it held one egg. By April 28 the set of five eggs was completed, and on May 12 the young birds here were several days old and covered with whitish down. There was much excrement on the rim of the nest. The young birds were still in the nest, but nearly ready to leave, on May 19. Thus approximately five weeks were required in this instance for nesting, from the beginning of building to nest leaving.

A nest found on May 15, west of Blue Fish Cove, contained only the broken shells of eggs which possibly had been eaten by Steller jays. Two jays were seen repeatedly in the near vicinity of this nest.

The first young linnet seen out of a nest was watched at 4 p.m. on May 17. It was accompanied by a pair of adults on a nearly vertical, north-facing cliff, directly over the water, along the shore north of China Cove. The young bird, which still showed tufts of down, was clinging to stems of plants and was being fed by the female. The male remained perched ten feet away.

The large number of old nests of linnet found on the area indicated that there was a large summer population there normally and that 1935 was not an exceptional year.

On the afternoon of July 4, numbers of linnets were impressive along Bassett Avenue, but the birds had to be routed out in order to perceive their really large numbers. At given moments counts were made of 5, 2, 15, 45+, 40+, 40+, 20+, and there were still more. The larger of these numbers were routed successively from the radish patches which in part still survived, blooming and seeding abundantly. Food calls of young linnets were heard from the patches, and from the isolated pines along the avenue, to which many of the birds resorted to "loaf." It was estimated that there were more than two hundred linnets here within twenty acres.

Pine Siskin

Spinus pinus (Wilson)

Pine siskins as residents in the Reserve were noted regularly, but usually not in large numbers. The largest flock, seen on December 11, contained about twenty-five birds. For most of the time the total population seemed to be around fifty individuals.

This species seemed most at home in the tops of the taller pines although individuals and flocks did extensive foraging on or close to the ground. It thus occurred both throughout the pines and on much of the open ground.

On December 26, seven siskins were watched southeast of the base of Whalers Knoll, along with a flock of green-backed goldfinches. They were feeding on the old heads of Napa thistle, and nothing else that could be seen. Even where the stems and heads were prone in the grass, the birds went after them. Thus a non-native plant was useful for a native bird species. These birds, far out in the open as they were, were "jumpy." Every now and then they would fly up simultaneously, circle about and alight again scatteringly, sometimes on the same ground, sometimes on new ground—just so the thistles were there. They seemed easily to distinguish these from the other last-year's plants. The siskins behaved in all respects the same as (in unison with) the goldfinches. (See pl. 9.)

In the afternoon of February 22, three siskins were watched feeding on the flowering heads of wild radish. Later, one of them was eating the ripening heads of sow thistle; another lit on a perpendicular stem at the top of a mustard plant and appeared to be eating the blossom-buds at the tip of the spike. After the bird left, examination of the plant indicated that it had been eating aphids near the top of the succulent stalk, though other similarly infested stems on the same plant had not been touched. Judging from comparative numbers left, the bird must have eaten in a few seconds nearly fifty aphids.

On March 31, eight siskins in one group were seen on wild radish plants. Several times, foraging birds were found in live oaks and once, May 14, one was heard in cypresses. Early in the morning of April 12, two were foraging on gravelly, bare ground along the eastern margin of the pines. During rain on the next day, two were foraging with linnets on the ground.

Siskins regularly came to the back yard at the Warden's House and bathed in a small pool maintained there.

Three nests were found under construction in the tops of pines, sixty, thirty-five, and thirty-five feet up. The first, on April 28, was on the northeast side of a small-topped pine on top of Rat Hill. The only bird seen here made many trips in succession to the ground for material. The second nest was at the end of a limb on the southeast side of a tree near the southwest margin of the pine woods. One bird pulled off lichens from neighboring pines and carried them to the nest, while the other one followed and perched near it. This was on May 1. On May 18, the third nest was found at a fork on a dead limb on the south side of a pine. The limb was hung heavily with lichens. As one bird gathered material (lichens), its mate stayed near it and sang.

A bob-tailed young siskin, barely able to fly, was found on May 19, clinging to the bark of a pine near the southeast corner of Mound Meadow. It was closely accompanied by an excited adult.

Green-backed Goldfinch

Spinus psaltria (Say)

Green-backed goldfinches were resident at Point Lobos in numbers about equal to those of the pine siskin. These two species were often associated together in foraging, even moving as one flock. Our observations were too meager to allow of detailed comparisons of the two birds. However, this species seemed to us to live closer to the ground, spending less time in the trees, and when in trees it went to lower ones and ones farther out in the edge of the woods. The goldfinches were more likely to be seen in bushes or tall shrubs than the siskins whose time was divided between the ground or low plants and the tops of high trees.

For example, the only nest found of this species was eight and one-half feet up, at the end of a bough of a twenty-foot pine. The limb was on the south side of the tree, which was at the southern margin of the woods north of Mound Meadow. The site thus was open to the south and west, but pines stood close on the east, and they provided shade in the morning. On April 26, the female was at the nest, which was thought then to be empty, and the male was near it. The male flew, singing (slow flight), to perch in the top of a dead pine fifty feet from the nest. The female was still brooding on May 11.

On April 18 a female was gathering willow cotton from a tree southeast of the Warden's House and flying off toward the southeast with it.

Spotted Towhee

Pipilo maculatus Swainson

Among the resident species the spotted towhee was one of the least numerous in the Reserve. Frequent shifting in the locations of individuals made it difficult to keep an accurate record of numbers, but it was thought that about fifteen pairs nested within the area.

Spotted towhees at Point Lobos inhabited the tracts of ceanothus probably more consistently than any other kind of plant. Here they found satisfactory forage places in the deep layer of leaf litter, as well as screen from disturbance by intruders and perching places moderately high whence they could view their surroundings. The older stands, where there was much leafless and decaying branchwork, were frequented more than the young vigorous thickets. Other plants conspicuous in the surroundings of towhees were sage, baccharis, low pines, monkey flower, poison oak, blackberry, and low thickets of live oak.

A nest was found on April 29, along the north margin of the pine woods southeast of Whalers Knoll. It was two feet up in a baccharis bush on the east side of a thicket thirty feet across, composed of blackberry, monkey flower, baccharis, and two young pines. The female was brooding four eggs. It flew off when approached within three feet. The site was twenty feet from an occupied nest of white-crowned sparrow in a denser portion of the same thicket. Small young were being brooded in this nest on May 11.

A pair of towhees, flushed on May 17, from near a fallen dead pine at the northwest base of Vierras Knoll, behaved as though they had a nest close by. Two days later a male was seen pursuing a California jay in this vicinity.

Savannah Sparrow

Passerculus sandwichensis (Gmelin)

The small number of resident Savannah sparrows, possibly five pairs, was supplemented in winter (1934-35) by about ten more birds. At this season single individuals and small groups of two or three were found scattered over most of the open ground at Point Lobos. They inhabited the grassy patches as well as the stubble and the mustard-covered area. One was seen, on November 18, in a patch of ice plant. Several times these birds were seen perched in lupine bushes and in low plants which projected above the grass; these were employed seemingly as lookouts for approaching danger or merely for resting in the sunshine.

Songs of this species were first detected on April 24, on the moist ground south of Carmel Cove.

One nesting pair was discovered. On the afternoon of May 16, a pair was watched carrying food to young in a nest twenty-one steps inside the north boundary fence and in the bottom of a moist swale which ran outside to the north. The nest, a shallow cup, was supported in grass about a foot high. When, on a second search, the nest was found, it was empty; but it had been just vacated for it contained a fresh fecal sac and a parent had hovered at that point less than five minutes previously.

A Savannah sparrow noted on August 11, on the seaward side of Mound Meadow may have been an early winter arrival. Beginning on September

17, large numbers of this species (more than 100) were noted regularly in the area north of the Warden's House where there was a tall cover of dead grasses.

Two subspecies were doubtless represented among the birds we observed: a resident race, the Bryant marsh (or Savannah) sparrow (*Passerculus sandwichensis bryanti*), and a wintering form, the western Savannah sparrow (*P. s. alaudinus*).

Oregon Junco

Junco oreganus (Townsend)

One race of junco was resident at Point Lobos, but other races of the same species were present as transients or winter visitants. Not only was this bird present throughout the year, but it was one of the most numerous of the land birds in the wooded portions of the area. As nearly as could be estimated after many counts and detailed examination of the whole area around one hundred pairs nested within the Reserve.

Juncos were predominately ground foragers and ground nesters, yet they were rather closely restricted to the neighborhood of trees. Such examples of behavior as the following, taken from our notes, illustrate habitat responses in the fall and winter. November 25: four or five feeding at margin of roadway and open meadow, partly in shade furnished by pines; six or more scattered on moist ground covered with fine litter in shade beneath cypresses; one feeding on mat of a plant, one and one-half inches high, beneath a cypress; scattered flock of fifty foraging on grass-covered opening in pine woods, flew to lower limbs of trees when disturbed; three or four in recently accumulated brush pile at margin of pine woods, feeding on ground beneath, and close to edge of, brush.

November 26: Small flock foraging in shade of pine at side of road in morning; small group feeding in shade beneath cypress near end of Cypress Point, also perched on limbs close to ground, a hermit thrush and Bewick wren at same place; flock feeding on path beneath shade of cypresses; several groups around margins of grassy areas in evening.

November 29: Into a lone pine a flock of twelve or more flew from nearby grassland, the tree clearly serving as a haven of refuge upon alarm, the awareness of the presence of the tree possibly accounting for the occurrence of the birds on the open ground at that point.

December 1: About fifteen foraging on sun-facing slope under cypresses and close to sea-brink, on ground surface springing lushly with new grass and filaree from a soft carpet of decaying tree-litter; some of the birds were scratching vigorously with quick fore-and-aft swings of the body.

December 10: Flock of about twenty-five, foraging on the ground in unused road, among litter of recently chopped tree, in shade of pine, in afternoon.

A junco was seen several times on May 1, catching insects in the air. Again on October 12, in the evening, several were flycatching for large termites.

From these and other records it was apparent that factors prominently important in accounting for the occurrence of juncos here were the open nature of the ground, the large proportion of the area in which shade was afforded, and the trees and tall shrubs which provided refuge, roosting places, and singing perches.

We soon noticed on our winter trips that the resident birds seemed to be paired and the flocks seemed to be made up mainly of winter visitants and transients. The pairs were stationed on the type of ground where the birds later nested and they behaved often as if they were defending the sites against invasion. This situation was detected as early as December and it was plainly evident by the middle of February.

Definite evidence of the beginning of the nesting season was seen on March 20, a cold, cloudy day when a pair in copulation was seen in a patch of monkey flower on the floor of the pine woods. Items observed

RECORD OF NESTS OF JUNCO FOUND AT POINT LOBOS

No.	DATE	LOCATION	STAGE	COMMENT
1	Mar. 24	ground	nearly complete	4 eggs on Apr. 8; 3 young Apr. 22
2	Mar. 24	ground	three-fourths complete	4 eggs on Apr. 8; empty Apr. 22
3	Apr. 8	ground	5 eggs	Young on Apr. 15
4	Apr. 8	ground	4 eggs	
5	Apr. 8	ground	4 small young	
6	Apr. 9	ground	4 eggs	
7	Apr. 11	ground	4 small young	
8	Apr. 15	ground	4 small young	
9	Apr. 16	ground	4 young	
10	Apr. 23	ground	4 young	
11	Apr. 23	ground	4 large young	
12	Apr. 24	11 feet up in cypress	4 young	
13	Apr. 25	14 feet up in pine	4 (?) young jumped out	
14	Apr. 28	ground	young leaving	
15	Apr. 29	18 feet up in pine	young	
16	Apr. 29	20 feet up in pine	young	
17	Apr. 29	ground	2 young ready to leave; 1 egg	
18	May 1	20 feet up in pine	young	
19	May 12	ground	4 large young	
20	May 18	ground	4 small young	
21	May 19	ground	3 large young	
22	May 19	ground	3 small young	
23	May 19	ground	3 large young	
24	May 20	7 feet up in pine	nearly complete	Young about to leave on June 20

subsequently in the breeding season seem more significant if reported chronologically. On March 22, juncos were noted in flocks for the first time in several days. In the cypresses they perched on and moved over the flat tops of the boughs and trees just as they ordinarily do on the ground. Ten individuals were seen at once in one tree.

Locations of nests and time of finding them are shown in the accompanying tabulation. The first nest was one foot north of the base of one of four small live oak trees. It was at the north margin of an opening in the pines. Both birds of the pair were carrying material to the nest, on March 24, when it was nearly ready for the lining. After one trip they attempted to drive away a female linnet in an oak tree ten feet away, but it resisted. The outcome was not seen. The set of four eggs later laid in this nest contained one runt not much more than half the normal size.

On March 24 nearly all the juncos seen were definitely in pairs and scattered mainly through the pine woods. The birds spent most of the time sitting quietly on perches in the trees. They fed largely in the trees, but about one-third of the time on the ground. Occasionally one or both birds of a pair would indicate excitement by spreading the tail and trilling, but this was followed by another quiet period. There was some singing—often three or four birds could be heard at once in different directions, but the locations of singing birds were hard to determine.

By April 8, juncos were much less conspicuous than they had been two weeks before. Apparently most of the pairs had eggs, though some of these had hatched. On the 10th only about ten individuals were seen all day. On April 15 many pairs were seen foraging. Apparently, at that time, many nests contained small young. These required food infrequently and the parents spent most of the time foraging for themselves. They moved among plants up to eight inches high, seeming to pick up exclusively or almost exclusively insects. They looked in every direction and reached upward to take objects from stems and leaves, as often as downward. It was hard to keep track of them in the tall vegetation. After feeding for a few minutes, the birds would fly to perches, usually fifteen to twenty feet up, such as a dead snag in the lower part of some pine where the bird would wipe its bill and sit quietly for up to five minutes and then fly back to the ground or off out of sight among the trees. The males sang more than they had in preceding days.

A junco was seen on April 18, pursuing two pileolated warblers among bushes at the north base of Rat Hill.

Young juncos out of the nest were first detected on April 22. One nest (No. 13) containing young was fourteen feet up on a lower bough of a large pine at the south margin of the grassy extension northeast of Mound Meadow. The limb, on the west side of the tree, was so filled with needles as to hide the nest completely from below. The location was determined by watching the birds go there twenty or more times with food. The young birds jumped out and to the ground when a pole was placed close to the nest. The parents showed less concern than usual for ground-nesting pairs until this time, and then they became greatly excited. They gathered food from near the margin of pines about one hundred yards to the southwest. The male once drove a green-backed goldfinch from the bough which held the nest. The young birds went in several directions and remained quiet on the ground.

It was noted at nearly all the nests in trees that the adults showed less concern and less reluctance to go to the nest when a person stood near the site than did most of the ground-nesting pairs. In one instance a nest was built in a tree, apparently by the same pair which had just brought off a brood from a nest on the ground.

The subspecies resident on the Reserve was the Point Pinos Oregon Junco (*Junco oreganus pinosus*). Most of the birds seen in vagrant flocks in winter, and closely scrutinized with binoculars or otherwise, belonged to the race Sierra Nevada Oregon Junco (*Junco oreganus thurberi*). A few mixed in with the latter were thought to be Northwestern Oregon Juncos (*Junco oreganus oreganus*). Specimens of each of these subspecies are in the Museum of Vertebrate Zoology from elsewhere in Monterey County.

Chipping Sparrow

Spizella passerina (Bechstein)

Arrival of chipping sparrows for the summer was detected on March 29. Thereafter this was one of the commonest species in the pines. It was estimated on May 17, at about the height of the nesting season, that there might be as many as one hundred and twenty-five nesting pairs in the Reserve.

In mid-April, next to linnets this was the most conspicuous singer in the pine woods. The forage habitat of the chipping sparrow was almost exactly that of the junco. Possibly this bird spent a little more time in the trees; it was not restricted to shady situations. Not only were the feeding places similar, but usually the two kinds of bird were feeding together and at the same time. Although most of the time was spent on the ground, chipping sparrows often flew to the lower boughs of pine trees. Singing perches noted averaged about twenty feet above the ground. Several times on May 1, one was seen to fly out and catch insects in the air close to pines. The more open, sunny portions of the pine woods were most closely occupied, especially the marginal trees. Foraging individuals moved far out across the meadows away from the trees, but upon alarm they always returned to them. (See pl. 14 fig. A.)

Aside from the use of common forage ground with other species, only a few examples were noted of any sort of response to other birds. On April 25, fighting chipping sparrows were noted at two places. At one of them three birds were concerned. Later, one of them returned to pursue a house wren that was gathering nesting material on the ground. On April 27, coition by one pair was noted three times at different places mainly close to the ground; the first time, a male junco flew to the location. In mid-afternoon on April 28, a chipping sparrow was bathing in a pool in the pines soon after a junco left it.

The first definite evidence of nesting was noted on April 12, when a bird was seen twice carrying materials into the lower limb of a pine at the northeast corner of Mound Meadow. The site was five feet up, and on the southeast side of the tree. The nest was newly completed and empty on April 22. It contained a single egg at 7:30 a.m. on April 25 and at 9 a.m. the following day. At noon on April 27, there were two eggs. Three eggs made up the set and they had hatched by May 11. The young were feathered and nearly ready to fly on May 19.

A second nest under construction was found on April 29, at the west end of a limb fifteen feet up in a sixty foot pine at the north edge of the woods. A nest found on May 2, seven and one-half feet up, on the south side of a pine in a thicket of small trees north of Mound Meadow, contained four eggs. This nest was only twenty feet from one of the Hutton vireo in the same group of trees.

Two nests were discovered on May 19. One held large young and was thirty feet up, close to the end of a limb on the east side of a pine at the east edge of Mound Meadow. The other was only thirty-five yards from the first nest mentioned above. It was ten feet up and six feet from the trunk, on the north side of a small pine north of Mound Meadow. Three small young covered with dark-colored down were being brooded by an adult.

On May 20, a nest was found under construction fifteen feet up in a pine at the northwest corner of Mound Meadow. Most of the nest material

was picked up on the ground and apparently by one bird. The mate usually followed this one.

A nest recently vacated by a brood of young was seen on June 19, in a lower limb of a large pine only thirty feet west of the Warden's House. It was five feet above the ground and near the end of a limb on the south side of the tree. Adults had been seen in this vicinity frequently during May.

A young bob-tailed chipping sparrow was being fed by a parent at noon on June 22. The youngster was perched on the floor of the pine woods close to the base of a small tree and it was calling loudly.

A chipping sparrow was recorded on September 17, and on September 21, several, some still in streaked plumage, were seen with juncos about picnic tables beneath pines.

White-crowned Sparrow

Zonotrichia leucophrys (Forster)

Among the resident birds at Point Lobos the white-crowned sparrow ranked high in numbers and in the proportion of the area occupied. In addition to the resident race at least two other races of the species occurred here during the winter and the migrations. Numbers in winter reached a total estimated at five hundred. At the beginning of the nesting season there seemed to be approximately one hundred and fifty pairs in the Reserve.

All through the year this bird stayed in the same general type of habitat—the bush-covered portions of the Reserve. All kinds of bushes were occupied to some extent, but lupines appeared to be more suitable than any other. The birds foraged a great deal on the ground between, and a short distance out from, the bushes, as well as within the foliage of them. They returned to the bushes for cover and for lookouts from which they could see approaching dangers. General types of food obtained in these situations varied widely, including the ripened seeds of the plants, the green leaves of plants, and insects. (See pl. 7 fig. B, pls. 8-10, pl. 11 fig. B, pl. 12 fig. B.)

It was especially interesting to watch the scattered flocks forage out over the open ground, yet keeping close to the bushes. For example, on March 21, about a hundred individuals were watched as they picked at young plants. They seemed to make no choice except to pick at the ones under an inch in height. Evidently the young plants were more acceptable than the more mature ones. These birds and the brush rabbits and ground squirrels operated to keep the plants at a low height between and close to the bushes.

Before the new growth of plants started, these sparrows seemed to depend upon seeds for most of their food. After the small plants passed the earliest tender stages, insects became abundant and the white-crowns turned to them as a food source. Several of the birds were seen on the evening of October 12, flycatching for large termites.

Groups of white-crowns were noted at bathing places on several occasions. Once, on December 10, several were bathing at a water trough where it was so far down to water that each bird had literally to swim to bathe. There were no perches from which they could reach the water. Individuals came regularly to the basin kept filled with water in the back yard at the Warden's House.

Roosting places of groups of white-crowned sparrows were discovered twice in December. At daylight on December 11, several individuals were

disturbed from their roosting places in the lower branches of isolated pines north of the Warden's House. The next morning at daybreak several more were disturbed from a dense thicket of live oak in the margin of a grassy area near pines. On November 29, last notes of this bird were heard in the evening at 5:15. Single songs given by individuals at night were heard occasionally during the spring.

The sharp-shinned hawks on the Reserve, although few in number, served to keep the white-crowns on the alert by their frequent raids and captures. An example was noted on January 3, when a hawk appeared from the direction of the pine woods, dashed down into the radish patch where white-crowns were feeding, and made a capture of a bird apparently of this species. When the hawk made its dash there was frantic exodus from its vicinity, but lots of birds remained under cover. At a brush patch not more than twenty feet in diameter—a tangle of live oak, poison oak, and blackberry—into which some sparrows had gone, fifty-six white-crowned sparrows were counted as they were routed out. They were very loath to leave cover after the hawk episode.

A method of escape from danger sometimes employed by this bird was noticed on February 22. An individual in the top of a lupine bush permitted close approach, then it left its perch and moved straight down through the center of the bush to the ground where it remained out of sight.

By February 19, there was definite evidence of nesting activity. Many individuals were singing in the tops of bushes. Pursuit flights were noted on several occasions. On March 23, several individuals on the eastern slope of Vierras Knoll showed concern when their vicinity was approached, and they were reluctant to leave. The next day, in the afternoon, three different ones were seen posturing, but although other birds were near, they paid no attention to the demonstrations.

The first nest found was two feet above the ground in a low bush on the east side of Vierras Knoll. A brooding adult was flushed from it on the morning of March 25. The accompanying tabulation shows items concerning the location, time of finding, and contents of the seventeen nests found.

RECORD OF NESTS OF WHITE-CROWNED SPARROW FOUND AT POINT LOBOS

No.	Date	Location	Feet from Ground	Contents	Comment
1	Mar. 25	ericameria	2	3 eggs	
2	Apr. 9	lupine	1	empty	3 eggs on Apr. 17
3	Apr. 12	lupine	1½	3 eggs	
4	Apr. 14	live oak	1½	4 eggs	3 young hatched on Apr. 28
5	Apr. 17	sage	1	3 eggs	
6	Apr. 22	ericameria	2½	2 eggs	
7	Apr. 24	live oak	1	4 young	
8	Apr. 26	blackberry	1	3 young	
9	Apr. 27	lupine	1½	3 eggs	
10	Apr. 27	sage	1	2 young	
11	Apr. 29	blackberry	3	4 young	
12	Apr. 30	pine	2	3 young	
13	Apr. 30	buckwheat		2 young	
14	Apr. 30	radish	1	3 eggs	shells of broken eggs on May 1
15	May 11	eriophyllum	1	4 young	
16	May 17	lupine	3	new, empty	
17	June 24	eriophyllum	4	3 young	

Additional incidents not readily shown in the table are contained in the following paragraphs. The numbers correspond to numbers shown in the table.

Nests Nos. 2 and 3 were only thirty-five feet apart and No. 5 was only seventy-five feet from No. 3. At least one of the pair at No. 3 had brown head stripes. One of the pair at nest No. 7 had brown head stripes, and at nest No. 4 both birds had brown head stripes.

Nest No. 10 was in a sage bush in a steep gully on a south-facing bluff, above the ocean shore. A parent bird was watched carrying food to the vicinity, and then the nest was located by the excited cries of the birds. When a person went near the nest the birds would not leave until he was directly over it. They then retreated for only a few feet. After a second search the nest was found, and also the cause for the alarm. A four-foot gopher snake was in the bush and almost touching one of the remaining young ones, of which there were two with feathers beginning to grow. Two fecal sacs had not been removed from the nest. The snake was not frightened even when touched by a person. One of the parent birds had brown head streaks.

Rain fell all the morning of April 29, when nest No. 11 was found. This was an especially bulky nest, nearly ten inches deep. Both parents were carrying food to the downy young. One adult, with brown head stripes, apparently had worked, food-gathering, all morning in the rain, for its plumage was completely water soaked.

Parents feeding young in nest No. 13 on April 30 were obtaining the food among, and in, the lower branches of some pines fifty yards away from the nest.

Nest No. 14, which was built in the center of a four-foot radish plant in the center of the patch north of the Warden's House, was the only one found not in a woody plant. The next day after the set of three eggs was completed there were only shells of broken eggs in the bottom of the nest. Apparently some animal had broken them to eat the contents.

Nest No. 15 was in a mat of eriophyllum in an opening sixty feet across, surrounded by large and small pines. The four large young birds were being fed by parents which entered the thicket on the ground from various directions, but which left from the top near the site of the nest.

Three white-crowned sparrows still in full song were heard on June 28. One was singing as late as 7:48 p.m. on that date. Another behaved as though insect-catching, but it was too dark to see what the bird was after. An adult was seen carrying food on June 30, although by this time most of the young were out. The latter were "ganging up," obviously apart from adults. A clear, full song of this species was heard at 7:45 p.m. on August 9, when it was too dark to see clearly.

The resident subspecies at Point Lobos is the Nuttall white-crowned sparrow (*Zonotrichia leucophrys nuttalli*). Wintering races, recognized at close range with the use of binoculars or otherwise, were the Puget Sound white-crowned sparrow (*Z. l. pugetensis*) and the Gambel white-crowned sparrow (*Z. l. gambelii*). A large, separately flocking group of *pugetensis* was present in December, January and February in the sage, mustard, lupines and horehound in the southeastern corner of the Reserve. Several individual *gambelii* were detected among the white-crowns in the radish patch and in the garbage gulch in November.

Golden-crowned Sparrow

Zonotrichia coronata (Pallas)

Approximately fifty golden-crowned sparrows, in groups of from two to ten individuals, were seen during the winter at Point Lobos. The records involved thirteen days between November 26 and April 16. It is possible that only transients were present and that no individuals spent the whole winter there, for none was recorded between December 13 and February 20.

In the fall golden-crowned sparrows were seen most frequently in lupine bushes, on sandy soil south of Point Beach and at the north base of Whalers Knoll. On December 13, two were foraging with juncos on the ground in a clearing among cypresses.

The small flock seen on February 20 was foraging in the morning on the surface of an old highway bed at the southeast corner of the Reserve. Several times during the spring, especially on March 21 and April 13, flocks of about ten were seen on the ground among bushes of lupine and baccharis near Point Beach. Here, along with white-crowned sparrows, these birds were scattered over the carpet of low vegetation, eating mainly the green leaves and young seed heads. They especially picked off the tips of plants just coming up and under an inch high.

On April 10 and 15, a group of golden-crowns was found at noon on the shaded north side of Rat Hill, beneath pines in a thicket of herbaceous plants. Two were seen on April 11, in a ceanothus bush near cypresses along the north shore close to the base of the main point. Ten or more individuals were seen about the woodpile in the pine woods at noon on April 14. The last ones detected in the spring were seen on the afternoon of April 16, on the steep, shaded east side of Whalers Knoll, thus illustrating the commonly noticed preference of this species for cool, shady situations during the time spent away from its summer range.

Several golden-crowned sparrows noted with white-crowned sparrows on October 11, in chaparral on the base of Cypress Point were the first ones definitely identified in the second fall. On October 21, two or more were seen in dead oats north of the Warden's House.

Fox Sparrow

Passerella iliaca (Merrem)

Fox sparrows were present through the winter at Point Lobos from the time of the earliest observations in the fall, October 20, at least to April 16. Scarcely ever were more than six individuals seen in one day. An estimate made early in January placed the total number present within the Reserve at 22.

Wintering fox sparrows in this vicinity inhabited nearly all of the areas of chaparral. The kinds of bushes frequented most were ceanothus, lupine, sage, and baccharis. The following examples show the nature of this bird's relationship to these plants. In the afternoon of November 25, a single fox sparrow was watched on the ground close to a ceanothus bush and fifty feet from a large, dense thicket. It was scratching and picking up seeds, and the cracking of them in its bill could be heard. However, most of the seeds were picked up on the surface and without scratching. The bird was on the east side of the bush. At about the same time of day on February 23, two fox sparrows close together were scratching in the dry leaf litter beneath ceanothus bushes on the southeast slope of Whalers Knoll. Although the

ground was shaded here, it was warm compared with the air outside the bushes on this protected slope and much warmer than the air in exposed places. Several times these individuals moved back momentarily into denser portions of the thicket.

At 10 a.m. on February 24, a fox sparrow flew up from within a thicket of ceanothus on the south margin of the top of Whalers Knoll and for several minutes perched in the sunshine on a leafless twig on the south side of the clump. One hundred yards away one was seen scratching in leaf litter at the southern edge of a ceanothus thicket.

At 9 a.m. on March 23, two individuals were watched among lupine bushes on sandy ground. One was scratching on the surface of the clean sand; the other was singing a low, warbling song.

Another place on the southern slope of Whalers Knoll where fox sparrows were seen regularly was where old dead ceanothus was interspersed with scattering pines. There were some shrubs of monkey flower and solanum and much decaying branch-work of both pine and ceanothus prone on the ground, all combining to provide ideal forage conditions for this bird.

All of the individuals closely enough scrutinized to render subspecific identification fairly certain belonged to the race Yakutat Fox Sparrow (*Passerella iliaca meruloïdes*). This subspecies was originally named, by N. A. Vigors, from a specimen obtained on the voyage of the *Blossom* at Monterey in 1827.

Lincoln Sparrow

Passerella lincolnii (Audubon)

During the year Lincoln sparrows were observed on nine days; the extreme seasonal dates were September 19 and April 26. Individuals were noted rather consistently in several types of surroundings. Several seen on November 26 and March 23 were in the thickets on sandy ground near Point Beach. In the angle in the southeast corner of the Reserve bordering the new highway where there was a patch of horehound and rank herbage, Lincoln sparrows were found on November 30, December 25, and March 29. Here each individual was solitary; it flew off by itself when closely pressed and did not join in with the white-crowned sparrows when the latter, alarmed, went to brush in a mass. The notes heard here were rather weakishly like those of the fox sparrow, not like those of the song sparrow.

In the area north of the pines where there were patches of tall grass and wild radish, Lincoln sparrows were found on January 3, February 22, and March 21. A great many (at least 50) were found here the following fall, beginning September 19, and in the dead oats and other grassy plants. Several were seen in sage and ceanothus, both live and dead, on the south slope of Whalers Knoll on October 23. One was seen on November 6, in flight from a cypress to a ceanothus.

Song Sparrow

Passerella melodia (Wilson)

A few song sparrows, not more than three or four pairs, nested at Point Lobos and remained on the area throughout the year. During migration seasons and in the winter a few additional individuals were present. Part of these belonged to races from more northern localities. The resident birds seemed to be located on the wall of the gulch at Gibson Creek and in the closely adjacent bushes. Singing individuals were heard in this vicinity all

through the spring. The largest number detected on one day was six, noted in the morning of March 23, and apparently mostly transients.

One was singing repeatedly and call notes of others were heard on June 28, in the vicinity of Gibson Creek. Two or more were seen here on October 20.

In the fall beginning September 17, a song sparrow was seen repeatedly close to the back yard of the Warden's House. It was observed in a geranium bed, about a trash pile, in a live oak thicket; but always in the same small area. On September 21, it was singing a low, warbling, irregular song. Also during this season many individuals took up residence in the thickets of dead grass and oats north of the Warden's House where, on the then barren stubble, there had been none the previous year.

As demonstrated by specimens from elsewhere on the coast of Monterey County, the race of this bird resident at Point Lobos is the Santa Cruz Song Sparrow (*Passerella melodia santæcrucis*). A bird closely scrutinized at the brink of Gibson Creek gulch on November 30 belonged to the race Rusty Song Sparrow (*P. m. morphna*).

MAMMALS

Mammals found in Point Lobos Reserve, 1934-35

Mole—*Scapanus latimanus* (Bachman)
California Bat—*Myotis californicus* (Audubon and Bachman)
Brown Bat—*Eptesicus fuscus* (Peale and Beauvois)
Coon—*Procyon lotor* (Linnæus)
Striped Skunk—*Mephitis mephitis* (Schreber)
Wildcat—*Lynx rufus* (Schreber)
California Sea-lion—*Zalophus californianus* (Lesson)
Steller Sea-lion—*Eumetopias jubata* (Schreber)
Ground Squirrel—*Citellus beecheyi* (Richardson)
Gray Squirrel—*Sciurus griseus* Ord
Pocket Gopher—*Thomomys bottæ* (Eydoux and Gervais)
Pocket Mouse—*Perognathus californicus* Merriam
Harvest Mouse—*Reithrodontomys megalotis* (Baird)
White-footed Mouse—*Peromyscus maniculatus* (Wagner)
Wood Rat—*Neotoma fuscipes* Baird
Meadow Mouse—*Microtus californicus* (Peale)
House Mouse—*Mus musculus* Linnæus
Jack Rabbit—*Lepus californicus* Gray
Brush Rabbit—*Sylvilagus bachmani* (Waterhouse)
Black-tailed Deer—*Odocoileus columbianus* (Richardson)

Mole

Scapanus latimanus (Bachman)

Workings of moles were found rather widely scattered over the Reserve. They were noticed most often where the soil was nearly bare, but this may have been only an incidental circumstance.

In late November workings were seen at many places, especially in roadways, in the area of pure sand, on recently cultivated ground, and on the grassland where the cover of vegetation was scant. One surface ridge was traced on November 26, which ran for more than twenty-five yards; another was marked at one end by a small, recently made mound. Some of the ridges

noted at this time were noticeably smaller than others; possibly they were made by young animals. On a small area of grassland only ten feet square, a group of seven small mounds was seen along with about fifteen feet of fresh ridges. (See pl. 25 fig. A.)

On November 30, near the verge of the bluff at a parking place west of Vierras Knoll thirty-four small mole mounds were counted on an area eight paces long and two paces wide. All these had been made since the last previous rain. Some of this area was rather hard packed and devoid of vegetation, but all of it was plentifully sprinkled with little piles of earthworm castings. Thus it must have been an especially favorable foraging ground for moles.

The skull of a mole was retrieved from the accumulation of mammalian remains found September 20 beneath the roost of a barn owl in the pine woods. The fact that 148 other skulls represented in those remains were all of rodents indicates the relative rarity of mole mortality from this kind of cause—that is, capture by owls.

California Bat

Myotis californicus (Audubon and Bachman)

Several times, small bats were seen which were thought to belong to this species; in particular, two that were flying along the margin of the pine woods at dusk (7:40 p.m.) on August 11. Specimens of this species are available from nearby localities.

Brown Bat

Eptesicus fuscus (Peale and Beauvois)

On the evening of August 10, from 7:25 to 7:37, one to three large brown bats, believed to be this species, were watched as they coursed back and forth along the shoreward, south side of the pine woods near Pebble Beach, at mid-tree to full-tree height above the ground.

Coon

Procyon lotor (Linnæus)

Numerous tracks of coon were seen in late November on the sand at Gibson Beach, indicating that an individual had come down Gibson Creek and had gone all over the beach and especially to the drift masses of kelp and edges of rocks along the tide-line.

During the fall a young female coon which lived at the Warden's House was watched by us many times. A visitor found this animal wandering without its mother out in the park early the previous summer, a short time after the ground squirrels in the Reserve had been poisoned. It was brought in and fed and tamed by the warden, but never kept captive. By the middle of December it behaved much as would a playful dog, often snapping at the legs of persons and then waiting to be pursued. It moved in a walk, trot, gallop, or by jumps. Often it appeared to have most of its weight borne on the hind feet with the front feet barely touching the ground.

The coon continually tested out objects on the ground or beneath water with its forepaws, keeping them in motion in a series of pats. It showed some evidence of difficulty in climbing. On small trees it folded its arms about the trunks. It went out to the tips of limbs of both oaks and pines, but was

Fig. A—Bassett Avenue, looking east, soon after this roadway was scarified for elimination. Nearly every trace of vegetation was gone and flocks of certain birds (killdeer, Brewer blackbird, Audubon warbler, and junco) congregated here to forage over bare ground. Photographed on February 24, 1935.

Fig. B—Bassett Avenue from same point as figure A, and four months later. Although ground was covered quickly with plants, the group of species was different from that on adjacent ground. Photographed on July 1, 1935.

Fig. A—Mole ridge and mound on western margin of stubble ground. Although conspicuous only on nearly bare ground, ridges like this one occurred over most of Reserve and in many types of soil, thus indicating wide-spread occurrence and large numbers of moles. Photographed on December 11, 1934.

Fig. B—Seal Rocks from tip of Sea Lion Point. When tide is low and ocean is quiet the sea-lions keep on lower rocks. When this picture was taken nearly all of them were on dark parts of rocks. Photographed on May 20, 1935.

not very secure on its feet. Once it fell three or four feet to the ground, but lit on all fours.

All of one rainy afternoon this tame coon followed two persons through the pine woods toward Vierras Knoll. It kept examining all sorts of objects such as logs, sticks, bases of trees, and mushrooms, several of which latter it pulled up. It dug many small pointed holes, three or four inches deep. Once it waded for one hundred yards or farther in the shallow water of a temporary stream through the woods. Always the animal of its own accord kept in the near vicinity of the persons.

Striped Skunk

Mephitis mephitis (Schreber)

Judging from the amount of digging in the soil, which we attributed to skunks, and the number of times live skunks were seen by us or reported by other persons, striped skunks must have been present in the Reserve in considerable numbers. Examples of encounters with live skunks in the Reserve are as follows:

At five o'clock in the afternoon of April 14, one was seen foraging on the floor of pine woods south of Rat Hill. It dug at the bases of two or three trees, moved among herbaceous plants several inches high, coming to within fifty feet of the observer, and then moved off rather rapidly through the woods. Late in the afternoon of April 17, one was seen in the road one hundred yards west of the Warden's House.

Early in the afternoon of August 10, a skunk thought to be not over two-thirds grown was watched as it moved about beneath the cover of plants near the garbage dump. This was in full daylight, though the sun was obscured by drifting low fog. The next evening at dusk one of about the same age was watched south of the road south of Mound Meadow. It moved rather rapidly around a picnic table and over a bank close to the shore.

Several carcasses of skunks were found, some that appeared to be remains of animals which died at the time squirrels were poisoned in 1934. Others were close to roads where they obviously had been run over by automobiles. Tracks were seen on several occasions early in the morning in dusty roadways.

Wildcat

Lynx rufus (Schreber)

On June 22, the skeleton of a wildcat was examined on a rocky knoll near the center of Cypress Point. The carcass had been discovered there nearly a year before, a short time after ground squirrels in the Reserve had been killed with poison.

California Sea-lion

Zalophus californianus (Lesson)

The California sea-lion was detected on the group of small islands beyond the tip of the point nearly every time those islands were examined with the aid of binoculars through the summer. This species was always associated with the Steller sea-lion, the latter being represented by much larger numbers. (See Rowley, 1929.) The dark coloration, the "hump" on the forehead, and the bark which resembled that of a hound, were characters which in combination served to distinguish this species. Apparently the two species were friendly, at least when on these rocky resting places.

On the afternoon of April 13, of between five hundred and six hundred sea-lions within sight from shore on the Seal Rocks, nearly one-fourth belonged to this species. They seemed to be fairly well mixed with the other species, but tended to be bunched on the northern part of the larger island.

On May 11, at least two California sea-lions were seen on the largest island and, on May 13, twenty-five were counted, including four large bulls. When the islands were examined in the morning of June 23, for more than an hour, only one individual of this species could be distinguished.

In the fall, on September 17, four or five were distinguished at the south and north ends of the largest island. In the afternoon of September 20, out of about one hundred sea-lions on the rocks, more than thirty were of this species, grouped toward the north end of the large island. On October 8, only two could be seen on the rocks.

Steller Sea-lion

Eumetopias jubata (Schreber)

The Steller sea-lion attracted more attention from visitors than any other mammal at Point Lobos. Not only was it the predominant species on the rocks off the shore near the tip of the point, but groups of individuals were to be seen frequently in the water close to shore. The animals were present the year round, but their numbers seemed to increase considerably in the spring, about the middle of April.

It was impossible to make accurate counts of individuals, but the selected series of estimates listed below shows minimum numbers and to some extent seasonal fluctuation in numbers.

Nov. 18	90	Mar. 31	173
Nov. 26	300	Apr. 13	264
Dec. 1	116	June 30	183
Dec. 26	162	Sept. 23	150
Jan. 3	30		

During the third week of September the numbers of sea-lions observed on the rocks varied between 100 and 150. About two-thirds of them were of this species. Most of the time they were crowded together in bunches, the two kinds fairly well separated. Many times, two individuals, usually of the same species, snapped at each other. Once a skirmish was seen between a California sea-lion and a Steller sea-lion.

Usually the sea-lions were seen hauled out on the rock surfaces above reach of the surf, lolling about, sprawled out, prone, with only rarely even a head raised. The animals seemed to be sunning themselves, with no concern for any kind of outside disturbance. Counting them from the shore was impossible because the animals kept so close together, often appearing even to be across one another. In the morning on November 6, a young one of the year was seen stretched out at full length directly on top of a resting adult.

The sea-lions on the lower ledges, evidently just out of the water and still wet, nearly always appeared shiny and dark colored. The ones high on the rocks, apparently dry, were dull and golden brown in color. Several observed swimming on September 24, appeared distinctly green when beneath the surface of the water. This was off the north shore. At the surface they looked whitish. (See pl. 25 fig. B, pl. 26.)

The sounds made by this species when on the rocks were much like those made by a herd of cattle—possible with a slightly lower tone. Sometimes they were deep-toned snoring sounds as if the animals were growling in

Fig. A—Seal Rocks from tip of Sea Lion Point. When surf is high the sea-lions go to highest parts of rocks where they are out of reach of surge. Photographed on October 21, 1935.

Fig. B—View of Seal Rocks from a rowboat, looking toward north. The sea-lions were aroused by near approach of boat and they are watching the intruders. The tip of Cypress Point shows in background at right. Photographed on October 15, 1935, by A. T. De Rome.

Fig. A—Habitat occupied by ground squirrels. The southeast-facing slope below margin of woods was most thickly inhabited by ground squirrels of any area in Reserve. This location thus seemed to meet best all of squirrels' requirements. Photographed on December 12, 1934.

Fig. B—Ground squirrel mound in stubble. The amount of soil brought to surface by this ground squirrel was large. Not only do many squirrels dig new burrows such as one at this site, but they continually throw out dirt from old burrow systems. Photographed on December 11, 1934.

Fig. A—Entrance to burrow inhabitated by ground squirrel in center of clump of bushes. When disturbed, the animal which often perched in bushes directly over the burrow had merely to drop to ground to find a safety refuge. Photographed on December 10, 1934.

Fig. B—Ground squirrel mounds near Point Beach. Compare with figures A and B, plate 29. Photographed on December 10, 1934.

Fig. A—Ground squirrel mounds, same as shown in figures B plate 28 and B plate 29. Photographed on March 24, 1935.

Fig. B—Ground squirrel mounds, same as shown in figures B plate 28 and A plate 29. These three photographs reveal a remarkable change in one season in plant cover at one squirrel mound. Obviously, one effect of activity of this animal is to cause and maintain variety in vegetation on ground it occupies. Photographed on September 24, 1935.

unison. On still nights these sounds could be heard easily at the Warden's House on the opposite side of the Reserve.

Several times there was some commotion in the herd of sea-lions. The nature or cause of the disturbance could never be determined satisfactorily. About 10 a. m. on November 6, when about two hundred animals were resting on the rocks, something frightened them and about half rushed off into the water, with great confusion among both the animals and the birds on the rocks. Within five minutes they were returning, but they were still aroused. This movement may have started from a quarrel between two individuals. The retreat of one may have been taken up by others until this whole group rushed off. Sometimes when a boat came near the rocks the sea-lions would move to the water and crowd together with necks and heads projecting into the air and watch the intruder.

Small groups of sea-lions were seen often in Point Cove in the surf, tumbling over one another, diving, and coming up with their heads together. Apparently these maneuvers were in the nature of play.

On several days in late September bunches composed of from ten to fifty individuals floating close to one another in a compact group at the surface of the water were noted in Carmel Bay. Sometimes a head was projected above the water and at times a front flipper would be extended upward into the air. Occasionally one or more individuals would swim off and apparently later return to the group. Swimming at such times was commonly by an undulating motion up and down, with the animal coming partly out of the water on each upward curve. A few times, an animal came up with such momentum that it went completely out of the water. Blowing when one came to the surface was several times heard on shore. Certain individuals swam in a nearly straight line close to the surface. Each group was followed by many birds, mostly Heermann and western gulls.

Ground Squirrel

Citellus beecheyi (Richardson)

Its large numbers and the many ways in which it affects its surroundings make the ground squirrel one of the important kinds of mammals on Point Lobos Reserve. Without more concentrated attention to this animal it was not possible to determine exact numbers. Poisoning carried on in the summer of 1934 doubtless reduced the ground squirrel population on the Reserve. By November many individuals were inactive, but we estimate that nearly five hundred were then present. After the great increase in the next spring, we thought the total number was near two thousand. Thus in one season there was so much recovery in numbers that the population possibly was larger than the area would normally support.

The squirrels were most numerous on ground which appeared to us to be best suited to them because it was clothed with vegetation that was low, and where vision would not be impeded. The presence of scattered boulders and bushes, used as lookout posts, may have been a compensating factor in some other places. Another character favoring presence of the animals was any slope, especially toward the east, where the soil would be well drained and where the squirrels could expose themselves to the sunshine. (See pls. 27-29.)

Food apparently was available in so great abundance as to have no importance as a limiting factor any time during the year 1934-35. The squirrels attracted many carnivores to the Reserve. but in so short a time there was

no prospect that the latter alone could offset the great increase of the previous breeding season. A more stable relationship might be established if the squirrels are left unaffected by artificial control over a period of years.

When our study at Point Lobos began, in November, only small numbers of ground squirrels were active on the surface. On the 27th of that month at the small clearing near Point Beach two were seen in mid-morning sitting at burrow entrances twenty-five feet apart. Later, one of these was chasing the other. At noon, one was throwing out dirt from a burrow on an east-facing slope south of Carmel Cove. Among the rocks at the western edge of the grassland, at least two were seen running to burrows when a dog approached them. When they were safe, they turned and barked at the dog. The latter dug a little at several burrows. Although fewer than ten squirrels were seen on this trip, at least one hundred burrows were found with freshly thrown-out dirt.

On December 10, several squirrels were seen about the grassy patch near Point Beach. Most of the holes examined at this time showed evidence of recent activity; some of the older ones appeared to be occupied by pocket gophers and fresh mounds had been thrown out by those animals. At others there were fresh earth plugs, possibly placed there by the squirrels.

When the Reserve was visited on February 19, the squirrels were out in much larger numbers than they had been in November or December. It was estimated that nearly two hundred were seen, half of them on the east-facing slope at the western border of the open grassland. There many were close together, and often members of a pair chased each other back and forth. The chatter heard during these pursuits was different from the usual barks of alarm. The animals were on the ground close to their burrows, on tops of boulders, and in the tops of bushes three or four feet high. They were eating the foliage of green herbaceous plants, standing on their hind legs to watch, or resting in hunched up or stretched out positions.

The locations of mounds nearly everywhere were indicated by their being covered with vegetation taller than that of surrounding ground, and this mound cover seemed always to be of plants differing from the surrounding kinds. Possibly the squirrels tended to delay the return of stable, perennial grasses by thus disturbing the soil. However, in spite of this, the final result of their activity over a period of years may well be more beneficial than harmful to the soil and its cover of vegetation.

The population at this time was so large that it was hard to see how more individuals could live permanently on the small area occupied. Apparently the kill by poison the previous year, although considered successfully effective, had no lasting effect on numbers. Also there seemed to have been no real scattering of the squirrels during the preceding fall. Possibly the kill, by removing nearly all the adults, had removed the animals which would have forced the dispersal of the young ones, and thus had resulted in a greater concentration and larger numbers than would have been there naturally. This leads to the idea that the colonies during this first spring after an eradication campaign really contained more individuals than they would when naturally stabilized. The absence at this time of rodent preying predators must have had a part in developing this condition.

The time from 9 to 10.30 a.m. on February 21 was spent in watching the colony of squirrels near Point Beach. At first only four could be seen. After half an hour, additional individuals were detected one at a time until eleven were seen at once. The squirrels spent their time feeding on the green vegetation, standing up on their haunches, digging, lying stretched out on the

bare dirt or gravel, or chasing one another. The pursuits were usually short ones. The animals took alarm easily—rushing off each time that foraging white-crowned sparrows in the vicinity flew to cover, and once when a shot was fired in the distance. Later, thirteen squirrels were seen at one time on this small area.

On the morning of March 19, four or more ground squirrels were seen in the sunshine on rocks along the north shore near the base of Cypress Point. During the next week, ground squirrels were less conspicuous than they had been a month earlier. Possibly this was on account of the thicker cover of vegetation in March. This time the animals seemed to be scattered a little more than before. Individuals were noticed often up on rocks, evidently there for greater warmth, and also in the tops of bushes. One in the latter type of situation remained quiet as a red-tailed hawk flew directly over it.

Several individuals out in the tall mustard and oats patch (western one), when it was examined on April 12, were so greatly hindered in their movements by the stems of the plants that a person could easily keep up with them. Others, even where the plants were shorter, where the burrows were most numerous, also were impeded slightly when they hurried to their burrows upon being disturbed. At this season the squirrels still spent much time on rocks in the sunshine. Many burrows were seen with freshly thrown-out dirt.

About the middle of April, it was noticed that at many of the systems of squirrel burrows in the Reserve there were small clumps of barley with seed heads forming. These had come up from the left-over, uneaten piles of poisoned grain used the year before in killing rodents. By the 24th the newly produced seeds had ripened slightly and the squirrels had pulled down all the heads and eaten them. Seeds of several other kinds of plants were being eaten at this time, most of them not yet completely ripened. (See pl. 30 fig. A.)

The first young ground squirrel of the season was seen on the afternoon of May 1 (the same day the first young gray squirrel was observed). It appeared to be three or four inches long, exclusive of tail, when it ran from beneath a lupine bush to a hole on the slope south of Blue Fish Cove. In the next two weeks several more young squirrels were seen in the same vicinity. Many trails were beginning to show through the thick grass, as if the squirrels had crowded their way through many times along the same line of least resistance. The young squirrels apparently had made little narrow trails of their own. At this time there was also some fresh digging of holes, refuge dens perhaps, farther out in the grassland than the old burrows.

On May 13, a squirrel was watched in the pine timber south of Blue Fish Cove as it carried a mouthful of paper and small sticks, evidently for nest-building purposes. Its line of travel extended for nearly a hundred yards through the woods. Another exceptional occurrence for this species was recorded on June 29, when a ground squirrel ran up the side of a spur of Rat Hill, right in the pine woods. On the same day an individual was seen at the seaward edge of the woods, perched at the top of a wind-flattened live oak festooned with morning glory. The next day one was seen up in the top of a dead ceanothus, eight feet above the ground, at the south base of Whalers Knoll.

On the afternoon of June 30, about twenty minutes was spent watching a family of six young ground squirrels about the base of the big wired cypress which hangs to the brink of the sea-cliff at the head of the cove just west of Little Dome. When persons approached, the sharp alarm cry of an adult

(female?) was heard at the base of the tree. Watch was kept from the opposite side of the gulch and it was several minutes before any squirrels appeared; then they came into view one by one, here and there among the sprawling roots and on the bluff-face, the lowest fully half-way down to the surf which was boiling in onto the little bouldery beach there. The youngsters were surely less than half grown—perhaps one-third by weight—yet each was exploring with seeming independence, finding things to nibble at among the roots of gray stone-crop and shrubs of eriogonum and a yellow-flowered composite. One squirrel dug, with quick movements of its fore-feet, into the soil at the base of a stone-crop plant, but only for a moment. Otherwise no visible displacement of rock or loose material was caused by the presence of the ground squirrels. Of course, it is likely that cumulatively, day by day, they caused accelerated gravitation of loose material and thus added to the effect of the elements in undermining the tree. But the latter's remaining rootholds will inevitably be weakened in major amount by the continuing assault of the sea beneath and the action of wind and rain above. Two of the squirrels entered a vertical crack in the solid rock below the tree roots and reappeared farther along the bluff-face (which was nowhere really vertical). Two of the youngsters engaged in a romping sort of play, jumping at each other, clinching, and rolling over and over together—almost off the edge. (See pl. 19 fig. A.)

Gray Squirrel

Sciurus griseus Ord

The gray squirrel was one of the conspicuous mammals in the Reserve, partly because of its large size and unafraid disposition, partly because it is active in the daytime through the whole year, and partly because of the everpresent signs of its home and feeding habits. Estimates of total numbers in this area varied upwards from one hundred, depending upon the time of year.

One word, pines, is enough to characterize the habitat of the gray squirrel at Point Lobos. Squirrels were found all through the pine woods and none was seen far from a pine tree. In these trees all the essential needs of this animal were fulfilled. The branches provided safe refuge from ground-prowling predators. Also in the tops of the trees were support and materials for the nests. Some food was obtained from the ground beneath the trees and thus was only indirectly derived from them, yet most of it was furnished by the trees directly.

Dependence of the squirrels upon the seeds of the pines for food was close, although they were not restricted to this one source. Scales and discarded cores of cones were conspicuous under the trees through the whole year, but especially in early fall. Squirrels carrying fresh cones, held at the base with the small end pointed forward, were seen often both on the ground and in the trees. Many times it was necessary for a squirrel in getting access to the cones on the limbs to cut off obstructing small branches and stems. These fell to the ground where they made conspicuous litter. The greatest amount of this cutting seemed to occur in mid-April. Three or four branches were watched as they fell from one tree; each dropped as soon as it was cut, and none had any bark stripped from it.

Counts made on June 29 at cone shelling places of gray squirrels showed eight, nine, five, and twenty-two fresh cores, respectively, as well as many cut green cone scales scattered about. At least by the last week of April, the squirrels began to cut the fresh crop of cones. (See pl. 30 fig. B, pl. 31.)

Another important food was the large toadstool (*Amanita*) which was abundant during the rainy season. During a rainy spell in the second week of April there was a new crop of these toadstools, a greater one than in the early part of the season. Almost every one had been broken off and the upper part eaten by squirrels, by April 12. Usually the stem was left. Fifteen such remains were noted within ten feet of one tree.

On March 25, a squirrel in the pines north of Mound Meadow was come upon as it was eating a toadstood which it had broken off at the base. It carried the whole thing by the stem crosswise in its mouth ten feet up to a dead pine stub where it continued eating—biting at the edges. When approached more closely, it took the food and moved higher into the tree. Another time, on May 1, a squirrel that was eating a large toadstool left it on a snag twenty feet up, when a person approached too near it.

Some examples of behavior which illustrate the extent of habitat occupied by gray squirrels are as follows. On January 5, in early afternoon, four squirrels were seen at once in the pines east of Mound Meadow. Two that were on the ground, one pursuing the other, went up and continued their pursuit in the tops of the trees. When two dogs passed on the ground below, one of the squirrels set up a continuous barking. One squirrel was alone, half-way up a tree, and another was seen leaving a nest forty-five feet up and eight feet out, on an upper branch of pine. One of the lone ones went to a nest and out and across to another, jumping across the interval between branches of adjacent tree tops fully fifty feet up. Apparently the squirrels went all through the woods without coming to the ground, following along familiar overhead ways without hesitation, each route including known breaks.

On April 10 four gray squirrels were watched on a small island in Blue Fish Cove. They crossed over on a pole which connected the island with the mainland. There they chased back and forth over the rocks and crossed back to the bluff. Several others were seen on rocks along the shore.

The squirrels spend much time out in places exposed to the sunshine. On April 12, one was seen sprawled out in the sun on top of a large horizontal limb in the top of a pine. On September 18, a clear day, several individuals were perched on limbs in the tops of pines and cutting scales from fresh cones. The next day was cloudy and not a single squirrel was seen.

About noon on December 11, a gray squirrel was watched as it buried some object in the litter near the base of a pine tree. Immediately afterward a careful search by persons in that vicinity failed to reveal the spot. The concealment had been too well made.

Another food source for gray squirrels in the Reserve was the acorn crop on the live oak trees. In the vicinity of the Warden's House in the early afternoon of November 9, a squirrel was watched as it crossed the roadway to a small scraggly oak about ten feet high. The squirrel climbed the leaning trunk and immediately began to search through the foliage. When an acorn was found the animal reached out and cut it off with its incisors, and then backed up or turned around to reach a more secure position. Then the acorn was transferred to the forefeet and the squirrel proceeded to hull and eat it. This procedure was repeated with little variation for fifteen or more times during the following five or ten minutes. The animal crawled to the very tips of some of the outermost branches. Here it hung head downward, supported only by holding on with its hind feet, and went through the whole procedure of cutting off, shelling, and eating acorns.

Responses of gray squirrels to the near presence of persons varied widely. Usually the disturbed animal would merely retreat to the safety of the upper portions of the trees or withdraw into a nest. Occasionally one would stop on some perch on a limb or snag and bark loudly and persistently for many minutes. Sometimes this form of protest at disturbance was supplemented by alternate rapping on the wood with the forefeet. The special significance of this type of alarm was not evident to us.

Once, on February 21, when "squeaks" were being made to attract birds, two squirrels came directly toward the source of the sounds on lines 90 degrees apart. One came to within twelve feet of the person and the other within twenty-five feet, before they stopped. The squirrels stayed in those positions for several minutes before going off among the pines.

Another time, on December 23, when a person was writing, sitting stock-still, back against a pine trunk at the edge of Mound Meadow, a gray squirrel came over the ground from back in the woods. It went directly to the person and onto his knee, whence it looked him in the eye for about two seconds, then without any appearance of sudden alarm it took a course without haste back into the woods.

Through the year the activities of the squirrels varied to some extent, possibly in part a result of varying weather conditions. The greatest amount of activity as revealed by the number of individuals seen abroad came in late March and April. This was before appearance of young of the year. For example on April 12, often three or four were in sight at once. One time, three (possibly 4) were cutting cones in the same tree.

The first young one of the season was seen at 8:30 a.m. on May 1, in a large tree near the western border of the pines. It was only one-fourth to one-third grown and was out sunning itself on snags next to the main trunk of the tree. Once it jumped about two feet to another trunk. When a person made squeaks near the young squirrel an adult came hurrying from another tree and barked. From May 14 to 19, young squirrels were seen almost daily, but they were not conspicuous and more than one was never seen in one day.

Pocket Gopher

Thomomys bottæ (Eydoux and Gervais)

On approximately one-third of the land at Point Lobos pocket gophers played the predominant part in modifying the physical character of the upper soil as well as in affecting the plant life and, less directly, the animal life there. They avoided three general types of ground: (1) the forest where there were few small roots; (2) the wet, soggy ground, where they could not keep dry; (3) the oldest, longest established grassland where, possibly, the sod was composed of roots too fibrous to be suitable as gopher food.

Judging from experience in trapping gophers, at other places, and by comparison of the visible evidence of their presence, it seems that one thousand would be a fair estimate for the average number within the Reserve during the year. This estimate is more likely to be too low than too high. The release from competition with domestic grazing animals assured a food supply far more abundant and steady than is usually found on so large an area—one that is also suitable for gophers in other ways. The attractant features of the habitat which seemed to account for so large a population of gophers here consisted first, of an adequate layer of top soil free from large obstructions and so situated as to be fairly well drained or at least to have a high proportion above the level of standing water. Next, an abundant crop of

Fig. A—Barley clumps at ground squirrel mounds. These plants grew from "spots" of poisoned grain put out to kill squirrels in summer of 1934. A week after this photograph was taken the squirrels inhabiting this burrow system cut off the heads of grain, to eat. Photographed on April 14, 1935.

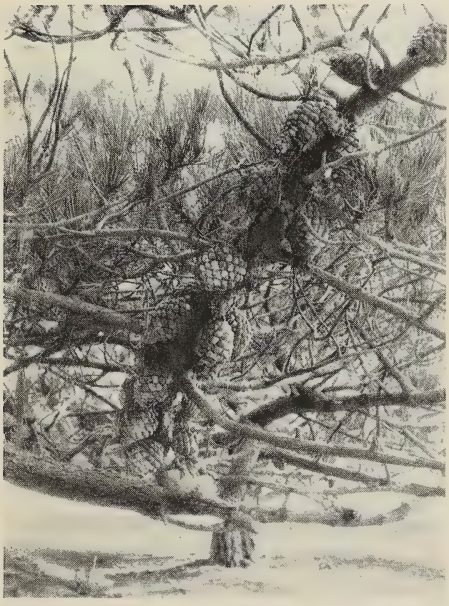

Fig. B—Cones clustered along a branch of Monterey pine, an old tree just north of Mound Meadow. Pine cones were main source of food of gray squirrel. Also birds such as pigmy nuthatch, chickadee, and downy woodpecker commonly searched for food among crevices in cones. Photographed on January 6, 1935.

Fig. A—Gray squirrel middens at base of pine. Includes both stripped and whole cones of old and new crops. Photographed on December 12, 1934.

Fig. B—Gray squirrel litter at base of a pine in early fall. At this season nearly whole floor of pine woods was covered with scales dropped by squirrels when they cut seeds from pine cones. Photographed on September 24, 1935.

Fig. A—Fresh pocket-gopher working in Mound Meadow. Here the dirt has been pushed out from side of one of mounds, falling down-hill. This shows that results of activities of burrowing mammals would tend to fill depressions between the mounds and thus to level whole area. From upper edge of plug to lower edge of fan measured 370 mm.; crosswise, hill was 440 mm.; depth of pile at middle, approximately 130 mm. Photographed on March 31, 1935.

Fig. B—Gopher mound at side of ditch southeast of Carmel Cove. Small ditches, either naturally cut or artificial, on Reserve, in season of gopher activity were quickly filled by dirt pushed out by these animals in manner illustrated here. Photographed on December 11, 1934.

Fig. A—Gopher workings on top of Whalers Knoll. Here, freshly pushed-out dirt made a continuous pile about four feet long. It is obvious that not many individuals are required to work over, in a short time, entire surface layer of the soil. Photographed on December 12, 1934.

Fig. B—Gopher workings near north margin of Mound Meadow. Even though this mound was of recent construction, plants already had started to grow on or through its surface. Four months later, cover of plants and effects of winter rains had removed practically all trace of this set of workings. The spot could be relocated only because it had been staked. Photographed on December 12, 1934.

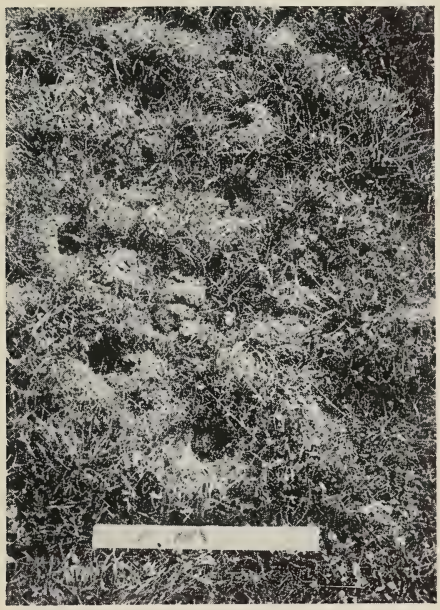

Fig. A—Plugged openings of vertical feeding burrows of pocket gophers, surrounded by alfilaria upon which gophers probably had fed. Photographed on December 11, 1934.

Fig. B—Gopher mounds (old and new) in stubble and showing how soil is reworked after lapse of long or short interval of time. This example indicated a shorter elapsed time than usual before an animal returned to a spot previously perforated. Photographed on December 11, 1934.

Fig. A—Gopher mound slightly eroded, close to a water pipe on side of a small ravine east of Carmel Cove. Later in winter, this ditch was so completely filled by new growth of plants that no additional cutting of soil took place. Photographed on December 11, 1934.

Fig. B—Gopher hole caved in and water-filled in a wheel track of a roadway during a two-day rain. By next day this hole was completely filled with dirt washed in, and afterwards only a slight trace of it could be detected. Photographed on December 14, 1934.

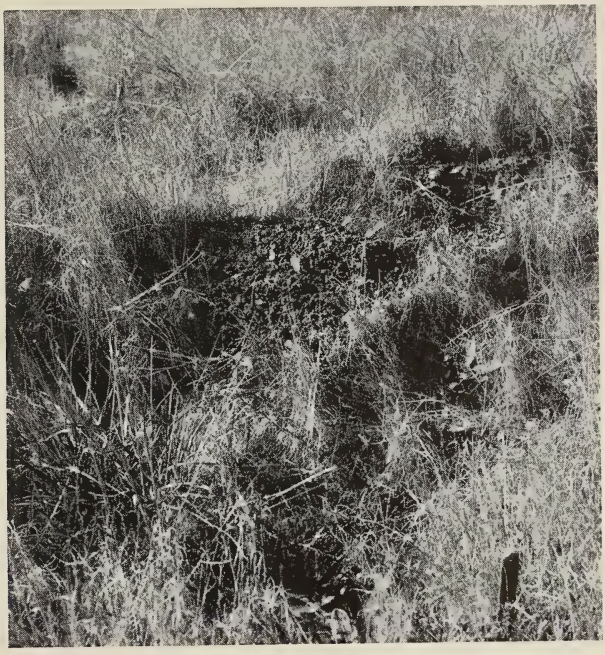

Fig. A—Gopher workings, freshly thrown out since a rain three days previously, in northeast part of Mound Meadow. Photographed on January 2, 1935.

Fig. B—Gopher workings shown in figure A, three months later. At this stage this mound was well beaten down and plants were beginning to grow on it. Photographed on March 31, 1935.

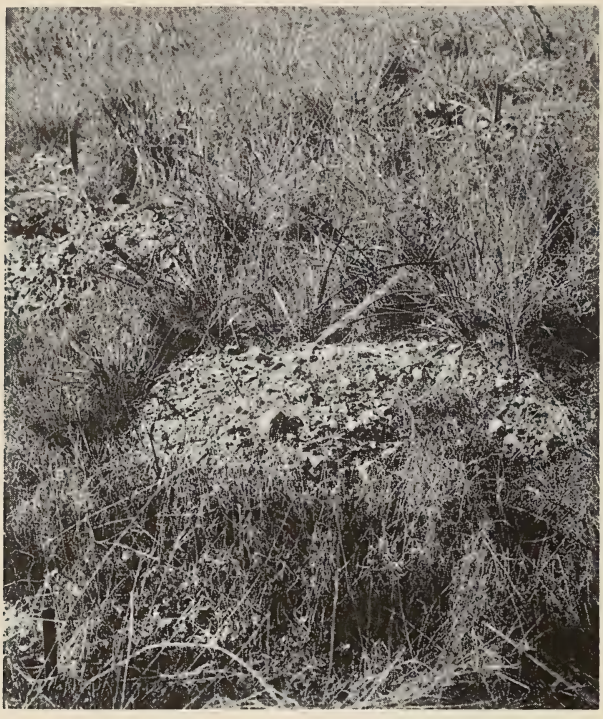

Fig. A—Weathered gopher workings on mound near northeast edge of Mound Meadow. Camera lens five feet from workings. The fine soil had been washed down, leaving pebbles exposed to weather. Photographed on January 2, 1935.

Fig. B—Site of gopher workings shown in figure A, three months later and hard to discern after it was overgrown lushly by, and sprouted to, grass and various herbs. Photographed on March 31, 1935.

herbaceous plants with thick stems and roots provided ample food. Then, at the beginning of the year, there were few predaceous animals here that might hunt for gophers. Later, these increased in number.

Pellets, fresh or nearly so, recovered September 20 (the second autumn season) beneath the roost of a barn owl in the pine woods contained remains of 149 mammals, and of these, 43 were of the pocket gopher. A population-regulating factor, of great significance in long-time process, is constantly operative in the form of such predators, which shift their forage location and their attention in accordance with the rodent kind available in one or another place in greatest accessible numbers.

Gophers were among the first mammals to invade the land after it was released from cultivation. Their mounds showed up conspicuously here and there on the stubble before that ground was covered with a layer of plants. The extent of the workings of a pocket gopher, that may be reached, is shown by counts made on November 30, in the vicinity of Pebble Beach within twenty yards of the shore. On an area 8 paces long by 2½ wide there were 64 eruptions—fresh ones since the last previous rain. These varied from mounds of normally large size down to holes plugged level with the surface, where stems of grass had been trimmed off above ground. This was evidently all the work of one gopher. The ground was well covered with young alfilaria and grass of three kinds. Also there was much material from the growth of the previous year. The damp soil was dark and full of fragments of abalone shells that had been exposed, weathered, and covered, recurrently, since they were left at the site in prehistoric times by Indians. (See pls. 32-37.)

Because of the possibility that gophers may have contributed in some way to the character of the mounds in Mound Meadow, some attention was paid to the workings there. On December 23, the workings were plentiful. They were on the highest ground as well as on the low ground where water stands during a part of the rainy season. A first impression was that the mounds held more workings than the depressions. Then on a section 118 paces long across the meadow all the workings were counted in a strip forty feet wide. There were 51 distinctly discernible workings on the tops or sides of the mounds, and 64 on the floors of the inter-mound depressions—the reverse of the first impression. It seemed that the distribution of the gophers was correlated more with the local occurrence of patches of salt grass (a preferred food) in the meadow than with anything else.

Pocket Mouse

Perognathus californicus Merriam

Recorded once when a single skull was found among 149 skulls of mammals from pellets picked up in late September beneath a barn owl roost in the pines. Because other known mammals were numerous in the Reserve in about the proportions represented by these skulls and because a barn owl was heard in the Reserve nearly every evening, it seems likely that this animal was caught in the Reserve.

Harvest Mouse

Reithrodontomys megalotis (Baird)

The harvest mouse proved to be one of the most numerous kinds of rodents in the Reserve. Although sign indicating its presence was less conspicuous for this species than for the meadow mouse, there must have been fully as

many or even more individuals of the harvest mouse. This was indicated by the results of live-trapping. (All the individuals trapped were at once liberated.) Out of the 149 skulls of mammals picked up in late September beneath a barn owl roost in the pines, eighteen belonged to this species.

This species was trapped in a great variety of habitat. It was abundant in late summer and fall in all the types of grassland, even on the most recently grass-covered ground. Several were trapped in the middle of a burned area, less than a month after the fire. In the pine woods, especially where the floor was covered with grass, large numbers of harvest mice were caught. Here the pine needles and sections of logs and remains of stumps provided refuge places for the mice. It is possible that all or most of the harvest mice in the woods moved there from the grassland after a dry period in summer. None was found there in winter and early spring. The bush-covered slopes of Vierras Knoll were well populated with these mice; many were captured there.

On February 22 a newly built harvest mouse nest was discovered in the radish patch north of the Warden's House. It was supported on old dead radish stems, not very well concealed from above because of the loose branching of the new growth. It was of the usual globular form, the top 270 mm. above the ground. Other nests were seen later in situations which closely resembled this one.

White-footed Mouse

Peromyscus maniculatus (Wagner)

Our observations indicated that very few white-footed mice lived in this particular year in Point Lobos Reserve. On September 25, an immature individual was captured on the western slope of Vierras Knoll near the top. It was in a place surrounded immediately by buckwheat bushes and about fifteen feet from large ceanothus bushes. This was the only one caught in several hundred sets of live traps. Out of 149 skulls of mammals picked up in late September beneath a barn owl roost in the pines only two belonged to this species.

Wood Rat

Neotoma fuscipes Baird

Presence of wood rats in the Reserve was indicated by their numerous stick nests. These were found in the pine woods, mostly among the live oaks there, but also in thickets of ceanothus and poison oak, and among the cypresses. It is difficult to estimate the size of the population, but the number living here must have been in the hundreds.

Among the clumps of ceanothus bushes on Whalers Knoll nearly every one of the dead bushes had a large wood rat nest built up about its base. These were of all ages, some merely ancient, rotting mounds approaching the humus stage. One new one was at least five feet high. The nests may have been placed here because of the availability of sticks in abundance. We saw no evidence to show that their presence had contributed to the death of any bush.

Nests about the live oaks were sometimes built around the base of a tree or over a conveniently near-by log; sometimes they were high above the ground within the crown of the tree. (See pls. 38-39.)

The arboreal nature of this animal was suggested by an experience on December 14. While we were photographing a nest at the base of a live oak, a wood rat ran out and onto a limb. In a few minutes it climbed higher and

Fig. A—Wood rat nest in leafless poison oak and ceanothus at base of south-facing, chaparral-covered slope near Point Cove. Scores of nests on Reserve were in situations like this one. Photographed on December 12, 1934.

Fig. B—Wood rat nest on a pine log in southern part of pine woods where lower strata of woods had been left undisturbed and thus suitable for needs of this rodent. Photographed on December 14, 1934.

Fig. A—Wood rat house at base of live oak near southern margin of pines. This site was closely surrounded by live oaks, pines, and shrubs. Photographed on December 14, 1934.

Fig. B—Wood rat house showing green leaves of live oak, green needles of pine and a toadstool that had been carried to the house by the rat. Same as shown in figure A. Photographed on December 14, 1935.

then jumped to a branch of an adjacent pine. Finally it continued through another pine and into a second oak where it ran down the trunk to another nest at the base of the tree. The whole distance traveled through the tops of the trees was about one hundred feet. The animal seemed to be at ease among the branches; evidently it was familiar with the route for it went almost directly to the second nest. No special disturbance had been made by the intruders, and the rat appeared to be in no hurry, for it stopped several times.

Owls probably catch more wood rats on this area than does any other type of predator. Twelve skulls of this animal were contained in 149 of mammals of eight kinds taken from pellets picked up late in September beneath a barn owl roost in the pines.

Meadow Mouse

Microtus californicus (Peale)

At the beginning of our year of study at Point Lobos we noted that there were fresh workings (tunnels, holes, cuttings, and droppings) of meadow mice in all of the meadows, with the greatest amount in the one north of the Warden's House where the vegetation made a thicker mat on the ground than anywhere else. Here almost the whole area was covered with the workings; evidently the population was approaching a peak, possibly on account of the removal of grazing farm-animals leaving an abundant food supply and few predators. At the same time, the area then in stubble showed no sign of meadow mice.

All through the spring the numbers of meadow mice grew until the increase reached the highest point just at the beginning of the driest late-summer season. By the middle of August the network of runways had been extended to nearly every section of the Reserve. The animals were most numerous in the grassland where there was a dense mat of dead grass and other plant material. Many runways were found on the ground that had been thinly covered with stubble the previous year. When this ground had been covered with a dense stand of mustard (February 22) no sign of meadow mice could be found. Afterward, however, a heavier growth of plants had replaced the mustard. The mice were then numerous also throughout the brushland habitat and a great many were present on the floor of the pine woods. They came to the neighborhood of the Warden's House and even entered some of the buildings there.

In this vicinity at 1:45 p.m. on August 11, a meadow mouse apparently of adult size was watched as it foraged out from the base of an artificially accumulated rock pile. In the bright sunlight and in plain sight the mouse was gathering dry grass blades and slivers of stems. At intervals it carried these back under the rocks. It was surprisingly oblivious to the sounds made by persons nearby and by passing automobiles. It appeared as though it could have been pounced upon by some predator with ease.

Meadow mice were active both during daylight hours and at night. Therefore they were available at almost any time for carnivorous birds and mammals. The marked increase in number of hawks on the area through the summer can be attributed largely to the increase in the number of this mammal. Several kinds of hawks were seen nearly every day flying back and forth over the meadow mouse colonies and paying close attention to the ground, obviously watching for opportunities to pounce upon these mice. Many times it was observed that apparent tries at capture were failures.

These occurred much more often than the successes. Sparrow hawks, marsh hawks, and red-tailed hawks were the kinds most often concerned. On April 12, a sparrow hawk was watched, at the top of a stub high in a pine, killing and eating a meadow mouse that was still kicking. In the first week of November, successful captures by a marsh hawk were seen twice. Vagrant house cats which entered the Reserve showed by their actions that they were stalking these mice as well as other rodents and birds.

According to the skulls found in pellets picked up late in September beneath the roost of a barn owl in the pines, this was the main kind of food sought by that owl. Out of 149 skulls of mammals in the pellets, representing eight kinds of mammals, 71 were of meadow mice. The entire owl population of the Reserve, inclusive of all the kinds and of vagrant as well as resident individuals, must have exerted significant influence in regulating the relative numbers of the different rodents as the populations of these fluctuated seasonally and otherwise.

House Mouse

Mus musculus Linnæus

The non-native, Old-World house mouse was a regular inhabitant of some of the buildings in the Reserve; also it was recorded once in the pine woods. One was examined on June 23, just after it had been caught in Whaler's House. Another was trapped at the Warden's House on August 11. On September 22, one was caught in a live trap set beside a log in the midst of open-floored pine woods. Out of 149 skulls of mammals picked up in late September beneath a barn owl roost in the pines, only one belonged to this species.

Jack Rabbit

Lepus californicus Gray

Jack rabbits were resident permanently in the Reserve, but only in small numbers. Probably not more than ten were present at any one time. The largest number seen together was five. This was in the afternoon of June 29. The rabbits all seemed of full mature size. They were within the pines on the north side of Mound Meadow. When approached they bounded off to the northeast over the floor of the woods. This is the general neighborhood where this species was seen most often.

Various situations where individuals were seen are as follows. On December 13 one was seen in the margin of a sage-bush thicket near the base of Cypress Point. One was disturbed from shelter beneath ceanothus at the western margin of the pines on February 21. It moved ten feet away to the shelter of another ceanothus bush and then ran off into the open on the opposite side of the thicket. On the morning of February 23, a jack rabbit was jumped from the south side of a brush pile fifty yards within the pine woods north of Mound Meadow. It ran in a circle, stopping at intervals, and entered a thicket of young pines fifty yards to the west.

In mid-afternoon on April 24, one was jumped from a much-used "form" in the grassland west of the pines. Another time one was disturbed from a form within a lupine bush on open ground. Near the southwestern corner of the pines, on the morning of May 16, a jack came hopping over the floor of the pine woods to within six feet of one of us and went on past, apparently not noticing the person. Several times it sniffed at stems of grass.

About noon the next day one was moving over the floor of the pine woods near this same place.

At 7:40 p.m. on June 28, a jack rabbit was jumped which ran beneath the big cypresses near the extremity of Cypress Point. Another time, on September 22, one that jumped from the margin of a small clearing in the western part of the pines circled and ran slowly, with ears erect, back into the pines fifty yards away. Three that were seen together in the morning of September 24 were in the edge of the pines along the south margin close to meadow and chaparral, but definitely among trees.

The examples from our experience recited above, as well as several others, demonstrate the marked preference of this species in this area for a wooded habitat, at least in the daytime, even when open situations were available in large extent and in great variety.

Brush Rabbit

Sylvilagus bachmani (Waterhouse)

The brush rabbit is one of the characteristic mammals at Point Lobos. However, its crepuscular habits and the nature of its habitat, which effectively conceals it from the view of a person, make the presence of this animal hard to detect. We have no good basis on which to guess at the size of the population. The number on the area probably varied between one hundred and three hundred.

The most conspicuous indicator of the presence of brush rabbits in the Reserve was the brushy type of cover which made up the brushland. Whatever the type of thicket, if it provided a protective screen close to the ground it was inhabited by brush rabbits. Apparently food was present in satisfactory kind and amount everywhere that bushes occurred. The plentiful sprinkling of droppings on the ground was practically co-extensive with the brushland. Even the pines and cypresses were suitable cover when they grew in low thickets. (See pls. 9-10.)

One of the ways in which a brush rabbit may modify its surroundings was detected along the southern base of Whalers Knoll. On December 28, many long, leafy twig ends (28 counted) of artemisia were noticed on bare ground around the periphery of a bush out from the main mass of chaparral. Other similar evidence was found in the vicinity. Diagonal cuts on the ends of stems around the periphery of the bush up to 450 mm. above the ground (the approximate limit of rabbit-reach) showed where they had been bitten off. The "switches" varied from old to fresh, as did the fecal pellets of brush rabbits strewn on the ground beside them. Close examination showed that many of the switches, four to eight inches long, were not terminal, but that they were sections cut at both ends. There was no evidence that the leaves had been eaten, but there was some indication that the stems had.

Presently a brush rabbit was jumped from among sage bushes nearby. It was concluded that brush rabbits were responsible for the trimming and that this resulted in the peculiar growth form of these particular bushes, when viewed in profile. In the same general vicinity on September 20 and 22, freshly cut ends of twigs of sage brush, ceanothus, and baccharis were found, all evidently left by rabbits. Possibly these cuttings are made most frequently at the time of greatest new growth of these plants.

Brush rabbits that were watched as they fed were seen most often on nearly bare ground such as paths, roadways, and parking places, where dense cover was conveniently near. At these parking places the rabbits appeared to be

eating the scattered young shoots of grass and herbaceous plants just as they came up. One such individual was surrounded by nine white-crowned sparrows, as it grazed obliviously of them within five feet of the edge of a mat of ceanothus.

As might have been anticipated from the known crepuscular tendencies of this rabbit, it was rare that one was seen out in the sunshine. Two were seen in the afternoon of June 30, in bright sunshine at the edge of sage brush. It is possible that these rabbits had been disturbed from a more shaded place. Usually they avoided the direct sunlight, and undisturbed individuals seen in the daytime were nearly always within some shadow. For example, at 3 p.m. on September 19, one was feeding beneath the margin of a lupine bush at the north base of Whalers Knoll. A Weston exposure meter, model 650, registered the reflected light from the ground in the immediate vicinity as from 25 to 50 (mostly 32 to 40) foot candles per square foot (see p. 9). At 5 p.m. on the same day a rabbit was noted out in a path in the shadow of a ceanothus bush under which it moved when disturbed. The light reading here was 20. The next afternoon at 4:45, a brush rabbit was out beneath pines and sage bushes southeast of Whalers Knoll, where the light reading was 4. On October 8, at 9:15 a.m., one was seen at the edge of a sage bush where the light measured 40.

These readings and other observations make it seem likely that intensity of the light is one of the factors important in determining directly the presence and activities of brush rabbits. Evidently the rabbits are active only in those situations where the light value falls below 50 candles per square foot. Thus the bushes not only protect the animals from predators but they serve to reduce the light to a degree which the rabbits can tolerate.

Evidence pertaining to the breeding of this species at Point Lobos is scanty. One that appeared to be not more than one-third grown was seen on November 27. On March 25, a young one that looked to be only about three inches long was seen on the eastern slope of Vierras Knoll. On the western slope of the same hill, on April 22, a hole about four inches deep with a mat of fur beside it was found that apparently had been a nest of this species. Another young one, of equally small size, was seen on April 26, among bushes on the hill southeast of Whalers Knoll. It must have just come from a nest.

Black-tailed Deer

Odocoileus columbianus (Richardson)

One deer was seen within the Reserve during the time of our study. A little after 6:30 p.m. on June 28, one was seen after its presence had been reported by persons who live in the vicinity. The animal was apparently a doe. At first it was standing among the low plants in the southeast corner of the Reserve, between the old roadway and the present highway. Presently it turned and bounded over the bushes to disappear over the brink of Gibson Creek gulch. Fifteen minutes later it was seen again, walking along the nasturtium-covered fill where the highway crosses Gibson Creek. The deer showed much more concern at the presence of two observers on foot than at the passing automobiles, even though the latter were much nearer to it.

Supplementary List of Vertebrates Reported from Point Lobos

The records listed below apply to Point Lobos but they come outside the scope of our main report. They represent observations by other persons, or by us outside the year 1934-35.

Green Heron—*Butorides virescens* (Linnæus). One observed on March 31, 1933, along the shore near Bird Island by L. O. Williams.

Harlequin Duck—*Histrionicus histrionicus* (Linnæus). Reported by Beck (1910, p. 69) from Point Carmel (= Cypress Point) on June 6. Chapman (1908, p. 268) reported a pair seen on May 29, 1903, by L. A. Fuertes.

Surf-bird—*Aphriza virgata* (Gmelin). Observed on February 25, 1933, by L. O. Williams.

Caspian Tern—*Hydroprogne caspia* (Pallas). Two were watched on July 3, 1935, near Carmel Cove, by L. O. Williams.

Cañon Wren—*Catherpes mexicanus* (Swainson). Noted near the tip of Cypress Point on October 10, 1933, by L. O. Williams.

Mountain Bluebird—*Sialia currucoides* (Bechstein). Flock watched on December 29, 1932, west of the pines, by J. Grinnell.

Lawrence Goldfinch—*Spinus lawrencei* (Cassin). Three were seen on March 11, 1935, by L. O. Williams on Whalers Knoll.

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VALUES OF VERTEBRATE ANIMAL LIFE IN THE RESERVE

The greatest value of wild animals to man is in the provision of a means for people to develop and preserve their skill in living. When outdoor life is recognized and prescribed as a necessity for maintenance of a suitable human environment, it is not alone the chance to be exposed to sunlight and uncontaminated atmosphere that is needed, but, more than that, it is the chance to see and to know by first-hand experience the natural objects which exist on the earth. Gaining an acquaintance with, and then learning to know, any of these objects is of benefit to the human organism because it brings to each organ system the type of exercise which that system has been developed to undertake. These objects may belong to the physical environment—rocks, water, air—or they may be living things, either plant or animal.

Even though animals are not the only items in this complex of factors so necessary to man for an outdoor environment, they are of primary importance. Primarily, they compel interest because they are alive. This interest, once aroused, tends to grow and to impel closer acquaintance with any living thing. Vertebrate animals are especially attractant to people because so many resemblances may be detected between their ways of living and ordinary human behavior. Once interest in animals is awakened, the next stage is the acquisition of a more tolerant attitude toward other aspects of the natural landscape.

We are now in a period of rather intense competition between various human agencies, both public and private, for the attention of seekers for recreation. Various administrators, of national parks, state parks, city parks, beaches, hunting and fishing preserves, forest areas, and many other types of land not subjected to intensive agriculture, are striving to attract some of the many persons who visit the out-of-doors. The early impulses in developing all these enterprises have been much the same. They involved an effort to make each area more comforting to the visitor and more attractive to casual inspection. This procedure naturally leads to rather low standards of appeal to the superficial type of attitude. The aim too often is merely to offer a tidy and conventional-appearing bit of ground.

Now, it soon becomes obvious to the person who studies plants and animals in their natural surroundings, and who at the same time associates with other people of similar predilections, that the greatest value to be obtained by persons who visit the outdoors is an acquaintance with some of the kinds of living things there, besides man, and with some of their relationships with their surroundings. It has been demonstrated many times that the interference, even in slight degree, by man with the environment of these organisms so upsets their natural adjustments that their chief inspirational significance is lost immediately. It seems plain, therefore, that in their efforts to "improve" areas for recreational purposes, officials are likely to destroy those very qualities which they wish to preserve.

From the point of view of relative values of various kinds of animals in the Reserve we might devise a scale, arranging them according to their native adaptation to the environment. In this sense, species would be most valuable which fit this area best—which contribute most substantially to the make-up of the fauna. The highest positive value goes to species most nearly representative of the habitats in the Reserve. All positive values are assigned to native animals and they represent kinds which should be preserved. Negative values may be assigned to non-native species which have no place here and which might well be removed. At Point Lobos this latter group is small in number of kinds and individuals and fortunately is of rather small significance.

PROTECTION AND PRESERVATION OF ANIMAL LIFE IN THE RESERVE

Whatever comments are offered here on protection and preservation at Point Lobos Reserve are intended to apply only to this one out of all the State parks. These ideas as to treatment have resulted from our recent study in this area and they are formulated to meet the special conditions which we have observed there. They may not be found to apply to parks in general or even to many State parks. Circumstances of size and location of each one, along with the degree of its modification by human occupation in the past, affect importantly the treatment to be devised for any given park.

As far as we have been able to learn, the original incentive for acquisition of Point Lobos as a park was to preserve for everyone "the most outstanding example on the coast of California of picturesque rock and surf scenery in combination with unique vegetation, including typical Monterey cypresses." As more and more study of the area is made, it would seem reasonable to enlarge the definition of this incentive. Our assignment was to study the terrestrial vertebrates, but we have interpreted this as involving also the evaluating of animals with respect to other values in the Reserve. The fortunes of any one group of things can not, we find, be disassociated from those of any other, or of all the others; the totality, living and inanimate, is tightly knit. Hence we have studied as many additional phases of the park problem as we were able.

The following suggestions, then, are not calculated to be recommendations for a highly developed zoological exhibit or even for stressing unduly the values of animals in any final program. We aim merely to contribute, at this time, to a definition of the most valuable kind of park to be maintained at Point Lobos and to stress certain precautions which now seem desirable for the continued existence of the best type of park at that spot.

We are informed that certain changes may be made in the Reserve for the purpose of increasing its appeal to visitors or for the efficient handling of traffic through it. We suspect that not all the plans in these directions

will really consider the Reserve as a natural unit, although it may still be spoken of as a primeval area. There can, indeed, as we see it, be no compromise in the matter of preserving the site as a natural area.

The exceptionally impressive natural features at Point Lobos exist because the processes of nature have thus far been disturbed so little that those features have been able to persist till now little modified. Every additional modification imposed upon these conditions by the aggressive ingenuity of man can but detract from the true values of these features, even though it may improve in high degree the appeal to our visual senses.

It should be emphasized that no matter what kind of change is made by the State, it can not restore or provide truly natural conditions; any such change must inevitably act to destroy or confuse the natural processes which control the natural conditions that exist at any one time level. It is true that many things can be done to improve the appearance of the area for the casual examination which most of the visitors will give it. But these "improvements" make conspicuous scars, these ever increasing in influence, for the people who have learned to recognize natural processes free from human interference. Each attempted improvement will tend to detract from the special value which the unique combination of circumstances has provided in this Reserve.

For too long have we been accustomed to admire "improved" nature, and thus we have fostered the very afflictions which parks may be expected to remedy. It is now commonly repeated that life in the cities is so far removed from the surroundings of preceding human generations that it is conducive to serious nervous and mental fatigue. A remedy often suggested is to make available such places as state parks where people may go to re-create their normal condition.

The main question arising here which demands to be decided is not one which has to do with profit or loss in money to any persons, or with any physical injury that may come to people in the parks. It is purely one of furthest esthetic appeal. Because the problem is one which is not often subjected to minute searching analysis it is likely to be settled in a most casual manner, on the basis of the most immediately arising practical considerations.

Administrators of parks need, we think, to convince themselves and then to help visitors in the parks learn that natural processes are capable of maintaining an area with all the desirable qualities just to the extent they are allowed to do so by not interfering with them. Artificial help is not required; indeed, it is not beneficial, but it is positively a hindrance to the natural and hence desirable expression of a truly primeval area. We can not make such an area, but we may so treat land by bona fide protection that its primeval qualities come to predominate. Again, we need to make no special plans for the benefit of the animals, the plants, or the rocks. What

we need to do is to conduct ourselves in such a manner that these objects may exist according to normal process on a long-time schedule.

The cypresses, pines, oaks, and all the other objects there compel interest at Point Lobos not so much in themselves but as indicators by which we may study and possibly come to understand in some degree the relationships which exist in nature and which have existed during a part of past time. For example, we, as visitors to the area, are interested only slightly in seeing white-crowned sparrows themselves; for this is a common kind of bird in our backyards at home. But we are intensely interested in seeing the normal responses of this species of bird to its natural environment in Point Lobos Reserve. If the area is allowed to make its own changes these responses will be natural, but with human interference it becomes another, artificial backyard.

There is urgent and immediate need to insure the preservation in California of bits of ground where remnants of natural undisturbed earth and its biota may persist. This need is especially great on the Pacific coastal strip of low-lying territory, which has been generally modified so completely and where nearly all the people in the State now live. The requirement is not for a museum or a mere collection of the kinds of objects (rocks, plants, animals) once found on this ground, but for undisturbed space where these objects may be seen continuing to play their normal rôle in nature and where people, who care to, may go to see and study them. Nearly all of these objects, as such, may be seen in abundance at some locality more conveniently accessible for most Californians than Point Lobos; but nowhere can they be freely examined and studied under undisturbed natural conditions such as can be preserved in this Reserve.

The fact that any proposed change is to be a small one as judged by human observation does not mean that it will be insignificant. The web of life existing at Point Lobos depends for its integrity upon the unrestricted opportunities for normal existence in long series of generations of all the organisms present. The aim of administrators here should, therefore, be to interfere as little as possible, and under no ordinary circumstances to modify—either to help *or* hinder—any of the elements which compose it.

It seems idle speculation now to attempt to foretell how the area will appear at any future time, even if left under absolutely natural conditions. And it must be more so if any step be taken to modify conditions. The interrelations of the nearly 300 kinds of flowering plants, the 150 or more kinds of land vertebrates, and the thousands of kinds of lesser organisms are too subtle and too complicated for adequate understanding—to say nothing of intelligent control.

As between ordinary economic exploitation and the possible scenic exploitation we can see no difference. The incentive for change is not the basis for harm, but the nature of the change; or rather, the existence of any artificial change is the basis for harm. This alone distinguishes the desirable

from the undesirable type of change. We maintain that the desirable qualities of this area are the ones which reveal the continuous adjustments to naturally changing conditions and not those represented in any permanent landscape condition.

If it is remembered that the site of this Reserve has become and has remained attractive through long time, even though lately subjected to some unfavorable human influences, the prospects for an immediate change to an unattractive situation because of *natural* influences seems slight. This element, of time, must be considered from the point of view of rate of change (and of interferences with it) and with the possibility in view of abrupt changes in the administrative policy with change in the administrative personnel.

We have found no indication this year that the number of visitors at Point Lobos need now be restricted, nor any reason to deny access to any portion of the area, to well-behaved persons on foot. However, we have seen abundant evidence that restrictions on the use of automobiles off the roadways need to be provided, and there are reasons to suspect that the Reserve would be benefited by limitations upon certain types of use now being made of it. The most serious present problems come from the picnicking and fishing.

Our time in the Reserve amounted to nearly a thousand hours, during which we took opportunity constantly to learn how the visitors responded to it. The following observations resulted from this phase of our study. Several categories of persons with widely varied purposes came to the area. Fishermen perhaps make up the largest group and most of these appeared to come solely on account of the accessibility of the ocean here; and they seemed to pay little attention to anything on the land. Picnickers, another large group, appeared to be even less aware of the details of their surroundings. Since they usually came in parties—as many as fifty were seen together—they were likely to be so preoccupied with their own activities, chiefly social in kind, as to miss almost entirely any contact with their surroundings unless this involved discomfort.

Other visitors came for any one of many reasons, some to get something of salable value, some to add a new locality to their travel experiences, some to rest, and some to see, hear, smell, taste, feel, and reflect upon, the realities of nature. Of all the types of visitors, the one least likely to justify his privilege of coming to the Reserve is the member of a crowd, and the one most worthy is the one who comes alone. This latter type is the one which should be encouraged and helped in as many ways as possible, even to the extent of restricting the pleasures of the crowds. In other words we believe that Point Lobos should be administered for the highest types of appreciation and not for any lower level of interest, even if not all visitors are now prepared to detect the higher values. Any other plan seems to us not to carry out the best purpose of this Reserve.

Here is a rare and much needed opportunity to cultivate a high order of discriminating appreciation of nature by, it is to be hoped, an ever increasing portion of Californians and visitors from elsewhere. We urge that the Reserve be so administered that its function shall not be merely to attract the fleeting attention of crowds, but that it shall be so cared for that it will draw within its inviolate confines the visitor who comes to refresh his spirit by communion with the primeval.

SUMMARY

Our 124 days of field observation within the year beginning in mid-November 1934 showed the presence in Point Lobos Reserve of 176 kinds of vertebrate animals—10 amphibians and reptiles, 147 birds, and 19 mammals. Twenty-eight per cent of the species of birds noted owe their presence directly to the influence of the ocean. Of the remainder, nearly half are kinds which forage mainly or entirely on the ground. One-fourth, possibly half the permanent residents, depend for a large part of their necessary activities upon bare trunks or dead limbs of trees. Approximately ten per cent of the species of land birds present are of carnivorous food habits; that is, they eat other birds or mammals. Five of the nineteen kinds of mammals the presence of which we detected are burrowers in the earth, and nine more do nearly all their foraging on the surface of the ground.

Environmental conditions in the area may be considered as composing four easily recognizable types of habitat: Grassland, including ground recently cultivated and now covered mainly with non-native plants, as well as that on which native grasses grow; brushland, more notably where lupine, poison oak, and ceanothus predominate; forest, as constituted by live oak, pine, and cypress; ocean shore, represented, in extremes, by sandy beach, rocky bluff, and island.

Our conclusions are that numbers of animals both as regards species and individuals are high in this reserve, this in part because of the number and diversity of habitats represented. Much progress already has been made on the part of the native plant and animal life in adjustment to the recent marked change in human use of the ground. As concerns the animals, the future trends and the rate of further reoccupation can be influenced for the good of the whole biota by our heeding a few simple precautions now. The vital factors entering here have to do not only with food in kind and continuity, but also with safety-refuge, roosting place, and lookout post, each of these circumstances as sharply borne upon by the peculiar instinctive set-up of each of the species, including length of its cruising radius. Presence or absence of a given species may be determined by the extent of development of one or another of the constituents of the environment.

Among all the kinds of vertebrate animals found at Point Lobos, the following are ones of more than ordinary interest because of their conspicuous manner of occurrence, their important effects upon the biota of the area,

or their high degree of adaptation to the environmental conditions obtaining within the Reserve.

Brown Pelican—Its large size, peculiar structure, and large numbers at Point Lobos combine to attract quick attention to this bird. Added interest comes from the fact that the breeding colony here is the only one known along the Pacific Coast north of the Channel Islands. This resource of the Reserve is likely to be continuously present as long as the home site of the breeding birds, Bird Island, is left undisturbed by man. We think it desirable that no person, not even any officer on the Reserve, be permitted to land on the island where the pelicans nest or roost. This measure is especially important during the nesting season, when disturbance may be fatal to the colony. Individual persons who watch the birds from the nearest point on the mainland can do no serious injury.

Brandt Cormorant, Pelagic Cormorant—These species are not likely to be distinguished by many visitors, but they offer continuous demonstration of two diverse ways of coping with one environment by separate, closely related species present here in abundance, but not easily observable at many other places along the Pacific Coast. Precautions desirable for preserving these birds are like those mentioned for the pelicans. Additionally, care should be taken to keep main trails and other loci of human activities back from the cliff edges overlooking the sites of nesting colonies, where these are close to the shore.

Western Gull—Among the several kinds of gulls, only this one is permanently resident at Point Lobos. Its large numbers and aggressive nature make it important here in the animal community along the shore. Thus it should rank high among the objects to which interest may be directed. Enforcement of the general rules in the Reserve are sufficient for protection of this species.

Raptorial Birds—Thirteen species of hawks, eagles, and owls were observed within the year at Point Lobos. These birds exert steady pressure on the populations of smaller animals and thus provide the necessary curb to overpopulations of them. The surest means for keeping the raptors is to maintain, uninvaded by trails, roads, and other human works, certain habitat reservoirs. Suitable ones occur only in the main area of pine woods and in the vicinity of Whalers Knoll. It is clear to us that the visits of golden eagles were due to the presence of these reservoirs, and of ground squirrels as a food source appropriate to this large bird of prey.

Road-runner—Sufficient numbers are present, and the chosen surroundings are so close to the routes traversed by visitors, that this bird attracts especial attention and is an emphatic reminder that Point Lobos shares many characteristics with the arid interior of the Southwest.

Bush-tit—The flock behavior and peculiar nesting traits of this western bird will make it one of the permanent attractions, especially to visitors acquainted with birds in other regions. Maintaining its normal surroundings

involves the protection in its natural condition of the vegetation of types transitional between brushland and forest.

Pigmy Nuthatch—This bird, though small, is so noisy and aggressive that its presence either in winter flocks or in nesting pairs through the pine woods adds a major feature of interest to these woods. Its requirement, especially in the critical nesting time, for the dead portions of the trees makes it imperative that these limbs and trunks be preserved with greater concern than even the living portions of the trees.

Linnet—The fact that the linnet is so widely abundant through the farmed portions of California makes more significant the added fact that it is also a prominent feature of the landscape at Point Lobos. At this locality we may expect to learn the true nature of the adaptation of the bird to its normal surroundings. It is one of the few kinds of animals to make important use of the cypresses.

White-crowned Sparrow—This sparrow is a conspicuous feature of that narrow coastal portion of California typified by Point Lobos. It is predominant in the brushland and its welfare here requires freedom from disturbance by unnatural changes in this type of habitat.

Steller Sea-lion, California Sea-lion—Continued benefit to the Reserve from presence of these aquatic mammals off the shore depends upon alert watchfulness to prevent killing of them by persons who may come in boats. Really adequate protection would require the availability to the warden of a power boat.

Ground Squirrel—The importance of this grassland mammal comes from its large numbers and the many ways in which it affects its surroundings. Visitors to the Reserve may learn to understand the native traits of this animal and to appreciate its place on wild land. If serious injury comes to the interrelationships here demonstrated it will likely be from following the tradition which demands regulation of numbers of rodents. It will require constant vigilance on the part of park authorities if this threat to the integrity of the Reserve is successfully forestalled. We urge that no ground squirrels be killed with poison on this area under any circumstances.

Gray Squirrels—Tree squirrels in their present numbers add greatly to the interest of the pine woods. This value is dependent partly upon retention of complete wildness, free of any attempt to tame the animals as by feeding.

Pocket Gopher—The most effective animal in the interaction between the soil, the plants, and the animals at Point Lobos is the pocket gopher. The true significance of each contributor to this complex relationship can be revealed by permitting it to go on entirely free from human interference. For this purpose the grassland, especially, must be guarded against disturbance by people.

Harvest Mouse—During the past year this small grassland mouse has been an important element in the fauna of the Reserve, mainly because no great disturbing action upset the natural change in the plant cover of the area.

Meadow Mouse—The majority of the predators at Point Lobos depend on this native mouse for food. It is the most numerous and most wide-spread mammal through the various kinds of habitat and it ranks close to the pocket gopher in its effect upon the Reserve. Continued benefits from this source depend upon constant watchfulness to preserve its surroundings. This implies no burning, mowing, planting, or removal of vegetation.

The primary values to be preserved at Point Lobos are those qualities of the area which reveal the continuous adjustments of its constituent elements to naturally changing environmental conditions; one of the conspicuous elements, but not necessarily the most important, is the existence of the cypress grove. The most valuable possession of the State at Point Lobos is the privilege of protecting the undisturbed relationships there existing between the organic and inorganic environment. These relationships constitute the most important element demanding protection of the features which appeal most immediately to visitors. This phase of the Reserve, however, is the one most liable to injury by administrative action. Its preservation depends primarily upon curtailment of human influence on the soil and vegetation, by taking the following precautions.

1. Keeping vehicular travel on designated, improved roadways.
2. Encouraging foot travel on improved trails.
3. Permitting complete freedom for natural processes in recovery and maintenance *everywhere else* than on improved roads and trails. Our observations have impressed us forcibly with the need for preservation of the soil at Point Lobos, *as it is, if* the vegetation and closely dependent animals are to be protected from harmful disturbance. As we see it, the greatest potentiality for damage in the Reserve lies in efforts to improve conditions.

More specifically we conclude that the human uses to be sanctioned in the Reserve are:

1. Visits by persons who come to learn by first-hand experience something of the realities of nature. This is the most valuable use, but these persons will remain so few in number as to require no special regulations restricting their movements on foot anywhere in the area.
2. Visits by persons (usually in groups) who come to ride in automobiles through the Reserve for mere glimpses of its most striking features. These persons should be required to keep their automobiles on a surfaced roadway or on parking places designated along it, and if they take to foot they should be encouraged to stay on the sharply demarked trails.
3. Fishing (doubtful). If permitted, should be done only along the south shore.

Contrasted with these, the most seriously injurious human practises to be prohibited (applies to workers as well as to visitors) are:

1. Removal of, or intentional injury to, any objects within the Reserve, including animals (except, possibly, fishes), plants, wood, gravel, and soil. Planting is also to be prohibited.
2. Building of fires, even in fireplaces.
3. Driving an automobile off a designated roadway or parking area.
4. Riding horses off trails or roads. Safety of rider and horse requires this, too.

In order to insure that the public will properly conform in behavior to the code of regulations finally adopted, there is needed, of course, adequate warden service. In a preserved area of such extent and located, as it is, on a main artery of travel, one warden is unable to cover the territory. We therefore advise the addition of a person, of special qualification for appreciating the natural values of the Reserve and interpreting these to visitors who are receptive. A further function of such added permanent officer would be to maintain record from season to season and year to year of natural phenomena relating to both the physical and the biological features of the area.

Finally, our purpose in advocating the fostering of consistently natural conditions in this Reserve is to encourage the preservation of all the inherent values to be found there.

December 30, 1935.

Joseph Grinnell,
Jean M. Linsdale.